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FEDERAL TECHNOLOGY CATALOG

MAY [illegible] 1985

SUMMARIES OF PRACTICAL TECHNOLOGY

PB85-106987

NTIS
Tech Notes
Annual Index

U.S. DEPARTMENT OF COMMERCE
National Technical Information Service
Center for the Utilization
of Federal Technology

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Write:

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National Technical Information Service
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prepared by the
Center for the Utilization of Federal Technology
National Technical Information Service
U.S. DEPARTMENT OF COMMERCE

January ***1985***

U.S. Department of Commerce
Malcolm Baldridge, Secretary

Joseph F. Caponio
Director, National Technical Information Service

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FEDERAL TECHNOLOGY CATALOG 1984

SUMMARIES OF PRACTICAL TECHNOLOGY

NTIS
TECH NOTES
ANNUAL INDEX

January 1985

CONTENTS

iv Federal Technology Transfer
iv About Tech Notes
v About this Catalog
v How to Use

Technology Summaries

1 Aeronautics & Aerodynamics
4 Agriculture & Food
7 Atmospheric & Astronomical Sciences
8 Biomedical Technology & Human Factors
13 Building Industry Technology
17 Chemistry
29 Civil Engineering
33 Combustion, Engines, & Propellants
36 Communications
39 Computer Technology & Software
46 Electrotechnology
60 Energy
76 Environmental Pollution & Control
89 Instrumentation & Testing
113 Manufacturing & Industrial Engineering
141 Materials
160 Medicine & Biology
169 Natural Resources & Earth Sciences
177 Nuclear Science & Technology
178 Ocean Technology & Engineering
180 Photography & Recording Devices
181 Physics
190 Space Technology
192 Transportation
195 Subject Index
at end How to Subscribe to NTIS Tech Notes
Order Form for Reports Identified from NTIS

FEDERAL TECHNOLOGY TRANSFER

U.S. industry has a great opportunity to use the technology developed by the Federal Government. Each year, the Government spends billions of dollars on research and engineering efforts. Most of the results are announced in the tens of thousands of technical reports and papers issued by the Government, whereas other results may never be formally issued or may be delayed until final completion of a project many years after its conception. Because of this vast amount of Federal R&D and the difficulty in identifying the most useful, Government agencies and their laboratories are making a special effort to identify that technology having commercial or practical potential, and then alerting industry, and State and local governments, to its availability.

The National Technical Information Service (NTIS) is involved in this active effort to transfer Federal technology. In response to the Stevenson-Wydler Technology Innovation Act of 1980 (P.L. 96-480), the Center for the Utilization of Federal Technology (CUFT) has been established at NTIS to alert industry and government to that Federal technology with the highest potential for commercial or practical use.

Information products are one important link in this technology transfer process. NTIS, through the sale of technical reports, has always played a key role in transferring Federal research and technology to the private sector. NTIS has also developed special services to publicize and license Government-owned patents, to promote federally produced computer software, and to announce new technologies. One means of announcing this technology is through a special product called *NTIS Tech Notes*. This is a monthly subscription product alerting its readers to new processes, equipment, materials, and software.

ABOUT TECH NOTES

NTIS Tech Notes contain fact sheets (often with illustrations) of new processes and products determined to have potential utilization in both the public and private sectors. These fact sheets are contributed by a number of sources, including the Department of Energy (DOE), the National Aeronautics and Space Administration (NASA), the Department of Defense, and other Government agencies and their laboratories. Every month, the Center for the Utilization of Federal Technology (CUFT) receives between 80 to 100 fact sheets highlighting newly developed technology. These fact sheets include DOE energygrams, U.S. Army's DARCOM Manufacturing Notes, the long standing NASA Tech Briefs, and technology application assessments provided by the Offices of Research and Technology Assessment (ORTA), established by Public Law 96-480. These sheets are used to develop three technology transfer information products: (1) the current awareness monthly subscription service, *NTIS Tech Notes*, announcing the complete fact sheets as they are received by CUFT; (2) computer on-line access to summaries of the Tech Notes fact sheets; and (3) this Federal Technology Catalog.

ABOUT THIS CATALOG

This catalog is a compilation and index to the more than 1,000 Tech Notes announced in the past year. Each Tech Note fact sheet has been summarized to provide enough information to allow a judgment whether a particular technology is worth pursuing. It provides *NTIS Tech Note* subscribers an opportunity to access those Tech Notes not covered by their subscription category, and non-subscribers will be able to identify and locate new Federal technology announced in the previous year.

HOW TO USE

This catalog is divided into two main sections: (1) Technology summaries, and (2) a Subject Index.

Technology Summaries

The main portion of this catalog consists of 24 broad subject groupings of technology summaries. These groupings have been chosen to provide a rough cut of technology in order to allow browsing of broad applications. If a Tech Note is applicable to more than one catalog, its full summary will appear in the first category and be cross-referenced in the others.

Subject Index

The subject index allows access to specific technologies. Each Tech Note summary has been assigned between one and four specific subject terms for inclusion in the index. Each index entry lists the Tech Note title, the subject category where the full summary appears, and the catalog item number for easy location within this category.

PREVIOUS EDITIONS

The 1982 and 1983 editions of this catalog are also available. Their price is $19.50 and $23.50 respectively, order numbers PB83-121533 and PB84-105634.
Please refer to the order form at the end of this catalog

These Tech Notes summaries can also be searched on the On-line NTIS Bibliographic Data Base. For a free brochure write: Tech Notes On-line, NTIS, Springfield, VA 22161. Ask for the free booklet, number PR-725.

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TECHNOLOGY SUMMARIES

Each technology summary is listed fully in only one of 24 possible subject categories. If a summary is applicable to more than one category, cross-references are provided. Within each category, each summary is arranged alphabetically by title. Each summary is assigned a specific catalog reference number for use with the subject index.

FULL SUMMARY SAMPLE ENTRY

Catalog reference number → 0560 **Metal Granulation Process for Production or Waste Storage** ← Title

Government agency → Department of Energy, Washington, D.C.

Date of announcement in *NTIS Tech Notes* → Mar *(C,D)* ← Subscription categories in which Tech Note fact sheet appeared.

Technology summary

A low pressure, water blasting technique used to convert contaimnated molten metals to coarse metal powder has been successfully demonstrated. The process is very simple and economical, with a high rate of production. The potential area of application is in waste management and disposal processes for both waste volume reduction and preparation of waste for ultimate disposal. The method could also be of interest in the production of granular metal.

FOR ADDITIONAL INFORMATION: Contact D. W. Jared, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830, (616) 574-4192. For publications, request support package 396/X/DB.

Source of additional information*

*If the source is NTIS, use the order form at the end of the catalog.

CROSS REFERENCE SAMPLE ENTRY

Metal Granulation Process for Production or Waste Storage ← Title

SEE 0560 ← Catalog reference number

TECHNOLOGY SUMMARIES

AERONAUTICS & AERODYNAMICS

0001 Airship Tested
Department of the Navy, Washington, DC.
Nov 84 *(D)*

The first modern technology airship to fly in 23 years is undergoing performance trials and maritime mission demonstrations at the Naval Air Development Center. Lighter-than-air (LTA) technology is being renewed as a result of energy conservation. LTA craft offer lower energy consumption and significantly longer flight time than conventional aircraft. The U.S. Navy and the U.S. Coast Guard are interested in airships for maritime patrol, search and rescue, and geo-survey applications. Emphasis is placed on modern technology features of the vehicle including tilting, ducted-fans (for vertical takeoffs and landings), and extensive use of composite materials.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, VA 22448. Refer to 090602/TN.

Binocular Overlap in a Fiber-Optic Helmet-Mounted Display Has Been Completed
See 0041

Boundary-Layer Equations for Two-Dimensional and Axisymmetric Flow: Finite-difference procedure solves for laminar, transitional, or turbulent flows
See 0957

0002 Chromium Ion Implantation Can Prevent Corrosion In Steel Bearings Used in Navy Aircraft
Department of the Navy, Washington, DC.
Jul 84 *(G)*

A team of Naval Research Laboratory scientists developed a chromium implantation technique as a solution to the Navy's bearing corrosion problem. The bearings have been field tested. AISI M50 steel bearings were treated to produce corrosion-resistant stainless steel surfaces by implanting their surfaces with chromium. (Due to the low strength of stainless steel, it cannot be used to fabricate an entire bearing.). In a related NRL program on the Manufacturing Technology of Ion Implantation, studies are being conducted to develop optimum ion implantation processing methods and to perform an economic case study on ion implantation.

FOR ADDITIONAL INFORMATION: Contact: Mr. Richard Fulper, Jr., Naval Research Laboratory, Code 1405, Washington, DC; (202) 767-3744. Refer to Note 84-0480.

0003 Circulation Control Upper Surface Blowing High-Lift Wing Developed
Department of the Navy, Washington, DC.
Oct 84 *(D)*

The circulation control wing (CCW) is a novel high-lift device for providing short takeoff and landing capability to high-performance aircraft. A program was initiated to develop a new concept that combines CCW with powered-lift upper surface blowing (USB) technology. The result is a no-moving-parts, pneumatic, high-lift system which exceeds the lift capability of the CCW. At the same time it is capable of deflecting thrust to increase or reduce lift and drag as needed on takeoff and landing. This work offers the possibility of doubling or tripling lift capability, reducing unassisted ground rolls by two thirds or more, and increasing liftable payload by 75 to 100 percent. The concept could also improve the reliability, maintainability, and safety of future aircraft.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, VA 22448. Refer to 090605/TN.

0004 Coating for Carrier Decks Improved
Department of the Navy, Washington, DC.
Mar 84 *(D)*

An improved non-skid coating for carrier decks that will make landing surfaces more durable is being developed by the Naval Research Laboratory. Carrier-deck resurfacing will not be required as often, which should result in considerable savings. The coating is not only long lasting but also resistant to arresting cable damage.

FOR ADDITIONAL INFORMATION: Contact: Navy Technology Transfer Fact Sheet, Code E411, Naval Surface Weapons Center, Dahlgren, Virginia 22448. Refer to 080902.

0005 Compressible Stability Analysis Code for Transition Prediction In Three-Dimensional Boundary Layers: Black box code for swept and tapered wings
National Aeronautics and Space Administration, Washington, DC.
Nov 84 *(A, D)*

COSAL is a fast compressible stability analysis code for transition prediction in three-dimensional boundary layers. It is specifically designed to compute the compressible linear stability characteristics and integrate the amplification rates of boundary-layer disturbances on swept and tapered wings. COSAL employs a finite-difference method to solve compressible stability equations in their original form.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602; (404) 542-3265. Refer to LAR-13042/TN.

0006 Crash Simulation and Nonlinear Structural Analysis: Behavior of structures composed of trusses, frames, and membranes is modeled
National Aeronautics and Space Administration, Washington, DC.
Dec 84 *(A, D)*

Crash simulation analysis is useful in developing an understanding of the multifaceted relationship between a complex structural configuration, such as an aircraft, and its response during a crash. Such an understanding can provide the basis for the crashworthy design of lightweight aircraft, better restraint systems, and efficient energy-absorption devices that may reduce passenger trauma. ACTION (Analysis of Crash Transients in Inelastic and Geometrically Nonlinear Structures) is a special-purpose computer program that provides special modeling and evaluation processes for crash simulation and nonlinear structural analysis. ACTION can represent the material and geometric nonlinear behavior of a structure composed of truss, frame, and membrane elements. The simulation is based on a discrete model of the structure using finite elements that respond plastically. The ACTION computer code is available in both CDC and IBM versions. The CDC version is written in FORTRAN IV for batch execution.

FOR ADDITIONAL INFORMATION: Contact: Computer software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602; (404) 542-3265. Refer to LAR-12926/TN and LAR-12927/TN.

Design and Fabrication of Composite Tail Rotor Components: Composites provide higher strength and lower weight
See 0616

0007 Determining Aircraft Altitude: Image motion and aircraft speed determine altitude
National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(K)*

The altitude of an aircraft could be determined rapidly from the comparison of digital pictures of the ground taken at different times or with different exposure times. The images would be recorded by a one-dimensional focal array of light-sensitive elements in a vertically oriented camera. A microprocessor would compute the altitude from the aircraft speed, the focal length of the camera, and the recorded image motion..

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15386/TN.

0008 Dissociated Airflow Effects During Plasma-Arc Testing: Program computes heating rates and surface-friction effects
National Aeronautics and Space Administration,
Washington, DC.
Sep 84 *(A, D)*

COLDARC predicts the heating rate and surface friction on a test article during plasma-arc testing. It uses a simplified frozen-flow model to represent the dissociated airflow and to predict the heat flux and surface friction, including the effects of retarded atomic recombination, from test facility data. COLDARC was developed as part of an effort to predict the heating rate and surface-friction effects on the thermal-protection system of the Space Shuttle orbiter during reentry. It takes into account the effects of dissociated airflow over the specimen and the associated heat flux and surface temperatures. COLDARC is written in FORTRAN IV for batch execution and has been implemented on a CDC CYBER 170-series computer.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to MSC-20522/TN.

Electronically-Scanned Pressure Sensors: Sensors do not have to be pneumatically switched
See 0481

Eliminating Wind-Tunnel Flow Breakdown: Floor nozzle ensures more realistic airflow
See 0482

0009 Extended Vortex Lattice Method: Aerodynamic characteristics are determined for up to four complex planforms
National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(A, D)*

The Extended NASA-Langley Vortex Lattice Method computer program, VLM, estimates the subsonic aerodynamic characteristics of up to four complex planforms. These complex planforms include wings with variable-sweep outer panels, wings with several changes in dihedral angle across the span, wings with twist and camber, wings with winglets, and a wing (or wings) in conjunction with a tail and/or a canard. VLM employs a vortex lattice method that is an extension of the finite step lifting-line method.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602; (404) 542-3265. Refer to LAR-13039/TN.

0010 Fast Generation of Boundary-Conforming O-Type Grids: Algorithm generates grids for arbitrary wing-body and axial turbomachinery geometries
National Aeronautics and Space Administration,
Washington, DC.
Feb 84 *(A, D, F)*

A fast algorithm accurately generates boundary-conforming three-dimensional consecutively refined computational grids for arbitrary wing-body and axial turbomachinery geometries. This algorithm has been incorporated into the GRID30 computer program. The method employed in GRID30 is based on using an analytic function to generate two-dimensional grids on a number of coaxial axisymmetric surfaces positioned between the center-body and the outer radial boundary. The program is written in FORTRAN IV for batch execution.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to LEW-13818/TN.

Fluidics -- Basic Components and Applications: Report highlights the applications of fluidics for home, industry, medicine, and aerospace
See 0967

0011 Interactive Graphics Analysis for Aircraft Design: Aircraft geometry is displayed on an interactive terminal
National Aeronautics and Space Administration,
Washington, DC.
Sep 84 *(A, D)*

The QUICK Interactive Graphics Analysis program, QUIAGA, displays aircraft QUICK-geometry data to aid in the detection and analysis of errors. The QUICK-geometry program generates a completely-analytical aircraft geometry description for use by finite-difference flow codes. QUIAGA incorporates subroutines to allow examination of the analytic definition of a configuration by generating cross-section plots and body-line plots on a graphics terminal. Available options include multiple cross-section views, hidden-line removal, the display of control point locations, and the comparison of cross sections with reference data. QUIAGA is designed for interactive use on a Tektronix 4014 computer display terminal connected to a host computer supporting the PLOT 10 graphics library. QUIAGA is written in FORTRAN IV for interactive execution.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to LAR-12951/TN.

0012 Lift Effect of Cambered Calculating the Vortex-Wings: Program computes the vortex-lift effect by using an improved supersonic suction analogy
National Aeronautics and Space Administration,
Washington, DC.
Feb 84 *(A, D)*

The computer program VORCAM calculates the vortex-lift effect of cambered wings by the suction analogy. VORCAM is based on an improved version of Woodward's chord plane aerodynamic panel method for subsonic and supersonic flow. This method was developed specifically for cambered wings exhibiting edge-separated vortex flow, including those with leading-edge vortex flaps. VORCAM is written in FORTRAN IV for batch execution.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to LAR-12985/TN.

Measuring Surface-Shear Stress in a Wind Tunnel: Two-wire skin-friction gage gives both magnitude and direction of mean and fluctuating stresses
See 0523

0013 Minimum Induced Drag of Nonplanar Wings: Numerical optimization techniques calculate the required bound-circulation distribution

National Aeronautics and Space Administration,
Washington, DC.
Mar 84 *(A, D)*

Increased interest in fuel-efficient unconventional aircraft concepts for future transport aircraft has created the need for accurate estimation of the induced drag of nonplanar configurations. Examples of these novel configurations include wings fitted with end plates or winglets, the tandem wing, and the joined wing. The DRG program incorporates numerical optimization techniques for calculating the bound-circulation distribution required for minimum induced drag of nonplanar wings. DRG employs a two-dimensional advanced panel far-field potential flow model of the undistorted interacting wakes of multiple lifting surfaces. DRG is written in FORTRAN IV for batch execution.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to LAR-12925/TN.

0014 New Parachute Controls Rotation

Department of the Navy, Washington, DC.
Aug 84 *(D)*

A controllable rotating parachute, developed at the Naval Weapons Center (NWC), is made with a canopy having a plurality of evenly spaced flaps along the canopy perimeter. Equal length parachute lines are attached to each corner of the flaps. The lines are gathered to two tie points with alternate lines along the canopy perimeter going to alternate tie points. A slack line is connected to one tie point and extended at a preset time to lengthen the alternate parachute lines causing a twisting of the flaps in a uniform direction. The twisting causes rotation of the parachute.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, VA 22448. Refer to 090201/TN.

0015 Noise Control in Propeller-Driven Aircraft: Double-wall sidewalls minimize interior noise and weight

National Aeronautics and Space Administration,
Washington, DC.
Apr 84 *(D)*

An analytical model predicts the noise levels inside propeller-driven aircraft during cruise at mach 0.8. The model has been applied to three aircraft with fuselages of different size (wide-body, narrow-body, and small-diameter) to determine the noise reductions required to achieve an A-weighted sound level that does not exceed 80 dB. The model was then used to determine noise-control methods that could achieve the required noise reductions. Only one concept, that of a double-wall sidewall, provides the high noise reductions required at low frequencies to achieve the 80-dB(A) goal.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: LAR-12954/TN.

0016 Non-Destructive Inspection Technician Capabilities Are Improved

Department of the Air Force, Washington, DC.
Dec 84 *(K)*

Recent wide-scale performance testing has resulted in challenges to the ability of Air Force non-destructive inspection (NDI) technicians to find flaws in aircraft structures with the precision and reliability demanded by aircraft design engineers. As a result, the Air Force has identified two urgent needs: first an analysis of relationships betwen NDI technician performance and personnel data, designed to identify particular features of good inspectors, and second a capability for NDI technicians to practice NDIs in Air Force field laboratories. These two needs represent the two objectives of an R&D effort. In the first objective, Armed Services Vocational Aptitude Battery scores and questionnaire-generated personnel data were compared to actual NDI performance test scores. In the second objective, specifications were developed for a stand-alone trainer that would allow inspectors to practice the ultrasonic NDI technique on the job. The specifications were divided into two phases. The products of the effort is a complete set of detailed specifications, including costs, for an ultrasonic NDI trainer. Potential payoff to both military and civilian non-destructive testing communities is extremely high.

FOR ADDITIONAL INFORMATION: Contact: Robert L. Summers, AFHRL/IDE, Lowry Air Force Base, CO 80230; (303) 370-2482.

PANEL Code for Planar Cascades: Plane cascade flow is solved using improved surface-singularity methods
See 0169

0017 Predicting Aircraft Noise Levels: Program predicts noise levels from data on fan, combustor, turbine, and airframe sources

National Aeronautics and Space Administration,
Washington, DC.
Apr 84 *(A, D)*

A computer program has been developed for predicting aircraft noise levels either in flight or in ground tests. The noise sources include fan inlet and exhaust jet flap (for powered lift), core (combustor), turbine, and airframe. The programs have the capacity to solve the geometrical relationships between an aircraft in flight and an observer on the ground. The program is simple enough so that the user can make any modifications that might better suit the application. The program is written in FORTRAN IV for an IBM 360 machine, but it can be run on any FORTRAN language computer with at least 120,000 bytes.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to LEW-13778/TN.

Proposed Short-Throat Supersonic Nozzles: Enlarged, fractional-radius-ratio transonic-nozzle throats promise negligible performance losses
See 0171

Reducing Aircraft-Engine Noise: Shock structure is modified to eliminate the associated noise
See 0172

Searching for Clear-Air Turbulence: An airborne microwave system would locate the tropopause to assist in the avoidance of clear-air turbulence
See 1019

Simulating Atmospheric Turbulence: Dimensionless time series for gusts and gradients have been calculated with a model
See 0037

0018 Subcritical Wing Design Code: program uses higher-order far-field drag minimization

National Aeronautics and Space Administration,
Washington, DC.
Aug 84 *(A, D)*

The computer program WDES WDEM is a preliminary aerodynamic design tool for one or two interacting, subsonic lifting surfaces. TThe program offers the user a subcritical winig design code employing a higher-order far-field drag-minimization technique. Linearized aerodynamic theory is used, in the form of a vortex lattice representation of the wings in the near field, along with a piecewise linearly-varying vortex sheet, higher-order panel method, model of the undistorted wake. This program is written in FORTRAN IV for batch execution.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Atenns, GA 30602. Refer to LAR-12959/TN.

Tooling Converts Stock Bearings to Custom Bearings: Grinding process uses a special bearing holder
See 0733

0019 Transonic, Axisymmetric Flow Over Nozzle Afterbodies With Supersonic Jet Exhuasts: Predictions require less computation than the Navier-Stokes solutions

National Aeronautics and Space Administration,
Washington, DC.
Aug 84 *(A, D)*

The nozzle afterbody is one of the main drag-producing components of an aircraft propulsion system. Thus, considerable effort has been devoted to developing techniques for predicting the aftebody flow field and drag. The RAXJET computer program predicts the transonic, axisymmetric flow over nozzle afterbodies with supersonic jet exhausts and includes the effects of boundary-layer displacement, separation, jet entrinament, and inviscit jet-plum blockage. RAXJET interatively combines the South-Jameson relaxation procedure, the Reshotko-Tucker boundary-layer solution, the Presz separation model, the Dash-Pergament mixing model, and the Dash-Thorp inviscid plume model into a single, comprehensive model.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to LAR-12957/TN.

Two-Degree-of-Freedom Mount System for Flutter Models: Flexible rods replace conventional bearing supports to minimize structural damping
See 0577

0020 Wing Subsonic Aerodynamic Performance Estimates: Solution by iteration estimates performance of twisted and cambered wings of arbitrary planform

National Aeronautics and Space Administration,
Washington, DC.
Feb 84 *(A, D)*

The SUBAER computer program estimates the subsonic aerodynamic performance of twisted and cambered wings of arbitrary planform with attainable thrust and vortex lift considerations taken into account. SUBAER is based on a linearized-theory lifting-surface solution that provides a spanwise distribution of theoretical leading-edge thrust, in addition to the surface distribution of perturbation velocities. This program is written in FORTRAN IV for batch execution.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to LAR-12987/TN.

AGRICULTURE & FOOD

0021 Aquaculture Methodology for Rearing Moluscs

Department of Commerce, Washington, DC.
Jan 84 *(E)*

A chamber for rearing oysters has been developed and tested at the Milford Laboratory of the National Marine Fisheries Service. The chamber allows for a continuous flow of filtered, temperature-controlled, ultraviolet-treated seawater washing over the molluscs that are suspended on a screen of appropriate size. Feeding may take place at programmed intervals, and the critical testing of nutritional or inimical materials may be conducted under controlled conditions. Construction of the chamber is not difficult and the design may be modified to accomodate various population sizes. This system can be scaled-up to a commercially useful size and, with modifications, can be used to rear other bivalves.

FOR ADDITIONAL INFORMATION: Contact: NOAA Office of Research and Technology Applications, Mail Stop (D), FB4, Room 3308, Washington, DC 20233; (301) 763-2419.

0022 Cage Culture of Yearling Surf Clams

Department of Commerce, Washington, DC.
Nov 84 *(E)*

The surf clam, Spisula solidissima, is primarily known as the object of a valuable, commercial-harvest fishery, which uses clam meats for processed or frozen products. Alternatively, aquacultural methods have been employed to produce 50 mm clams in less than one year. Well-established methods of hatchery and nursery culture have been used reliably for spawning and rearing the clams through their larval and juvenile stages to an 18 mm 'seed' size. Recent experiments have developed methods to grow the seed to a potential market size, by protecting them in cages in the natural environment. The results promise the basis of a complete egg-to-market culture strategy within approximately one year. The combination of the species' rapid growth and a highly productive nearshore environment makes this possible.

FOR ADDITIONAL INFORMATION: Contact: NOAA Office of Research and Technology Applications, FB 4, Room 3316, Suitland, MD 20233; (301) 763-2418. Refer to 84/NMFS/087/TN.

0023 Energy Integrated Farm System: Mathis Farm and Georgia Institute of Technology

Department of Energy, Washington, DC.
Dec 84 *(C)*

Mathis Farm, a dairy farm with corn and soybean crops, is designed to conserve energy through energy integrated concepts including energy-efficient farming practices, methane digestion, irrigation and wastewater management, and efficient use of electrical energy. The integrated energy concepts to be demonstrated are: Anaerobic digestion of cattle manure to produce methane; to provide electricity; use of digester sludge materials as bedding and fertilizer; farm energy audit and subsequent implementation of energy conservation practices; waste management on the farm; and energy conservation crop practices.

FOR ADDITIONAL INFORMATION: Contact: James L. Walsh, Jr., Technology Applications Laboratory, Engineering Experiment Station, Georgia Institute of Technology, Atlanta, GA 30332; (404) 894-3636.

0024 Evaporation Tower With Prill Nozzles: A tower could be more efficient than conventional evaporation equipment

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(D, G)*

Liquids such as milk and fruit juice could be concentrated by passing them through a tiny nozzle to form droplets, then allowing the droplets to fall through an evacuated tower with cooled walls. Because of the uniformity and small size of the droplets, a greater percentage of water would be removed than might be possible with conventional evaporation equipment.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for the commercial use of this invention should be addressed to Paul F. McCaul, NASA Resident Office-JPL, Mail Code: 180-601, 4800 Oak Grove Drive, Pasadena, CA 91103; (213) 354-2700. In either case refer to NPO-15609/TN.

0025 Fish Aggregating Device (FAD)

Department of Commerce, Washington, DC.
Feb 84 *(E)*

Fisherman have long known that tuna aggregate around floating objects such as logs, masses of drifting seaweed, and other flotsam. They have used this knowledge when fishing for skipjack and yellowfin tuna in the eastern and western Pacific. To determine the benefit from this type of fishing in areas where drifting logs are scarce, a study of anchored devices was undertaken. Two types of devices were deployed and both showed good results in attracting and holding marketable fish species.

FOR ADDITIONAL INFORMATION: Contact: NOAA Office of Research and Technology Applications, Mail Stop (D), Room 3308, FB 4, Suitland, MD. 20233, (301) 763-2419.

Frost Forecasting for Fruitgrowers: Progress in forecasting from satellite data is reviewed
See 0035

Impact of Land-Based Biomass Production: Several models are evaluated
See 0914

Improved Cattle Hauler: Better aerodynamics and ventilation would increase fuel efficiency and decrease shipping losses
See 1013

0026 Jamming Courtship Signals with Scent Molecules May Curb Insect Pest

Department of Agriculture, Washington, DC.
Jul 84 *(E)*

A courtship lure that the male tobacco budworm moth disperses into the air has been found by scientists to divert other males from the female. U.S. Department of Agriculture scientists identified the lure in an ongoing search for natural chemicals that disrupt matings of insects and thereby reduce the population of the next generation. The new pheromone is an aldehyde, (z)-9-tetradecenal. It was identified by the agency's Tobacco Research Laboratory, Oxford, NC. The new pheromone has the potential to curb population of tobacco budworms by reducing the number of matings. This new pheromone should be of value to researchers studying how insects translate chemical codes into the nerve signals that bring about specific behavior.

FOR ADDITIONAL INFORMATION: Contact: Martin Jacobson, Biologically Active Natural Products Laboratory, USDA, ARS, BARC-East, Beltsville, MD 20205, (301) 344-2025.

0027 Making Food From Sawdust

Department of the Navy, Washington, DC.
Jul 84 *(E, J)*

Making food from sawdust has recently become a real possibility because of shipworm research sponsored by the Office of Naval Research (ONR). While studying the shipworm--a destructive, wood-eating, bivalve mollusk--researchers discovered a unique, new bacterium which appears capable of making protein from wood. The new species of bacterium (as yet unnamed) is found in mass in the shipworm's gland of Deshayes, located between the gills and esophagus. What makes the bacteria unique is the fact that it can digest cellulose (in this case wood) and fix nitrogen, which is essential to proteins but lacking in wood. The new bacteria are of commercial interest because they may be able to convert wood and wood products into useful proteins, suitable for fertilizers and animal feed.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, Virginia 22448. Refer to 090202/TN.

0028 New Technology Stretches Scarce Water for Irrigation

Department of Agriculture, Washington, DC.
Sep 84 *(D)*

A new irrigation system technology includes a central computer that starts and stops water lines. Called the travelling trickle irrigation system (TTIS), it has been designed primarily to stretch scarce water. Sensors monitor soil moisture and plant transpiration to gauge exactly when plants need water. Lasers then guide the movement of portable water towers that travel along the rows of plants. Infrared thermometers on top of the towers measure and record foliage temperatures. The foliage temperature is related to surrounding air temperature, humidity and plant transpiration. This data is computerized and used to determine whether the crop needs water. Photovoltaic solar cells provide power for moving the towers over the field and to other fields. A computerized weather station records solar radiation, wind, air temperatures and humidity.

FOR ADDITIONAL INFORMATION: Contact: Dr. Claude J. Phene, Water Management Laboratory, Agricultural Research Service, USDA, Fresno, CA 93727; (209) 291-3511.

Procedure For Benthic Resources Assessment (BRAT) Has Been Developed

See 0945

0029 Quality Improvement of Frozen Widow Rockfish Products

Department of Commerce, Washington, DC.

Mar 84 *(E)*

The fishery for widow rockfish (Sebastes entomales) off the Pacific Northwest Coast of Oregon and Washington expanded substantially in the past few years as a result of improved fishing technology. As the fishery expanded to over 20 million pounds landed, the unprecedented landings made it difficult to expand fish markets rapidly enough to absorb the increased production. As a result, problems in loss of quality appeared in both the chilled and frozen products held too long before processing or marketing. The Northwest and Alaska Fisheries Center is attempting to develop methods of minimizing loss of quality of fresh frozen widow rockfish. The results of comparative studies have determined that the frozen quality of widow rockfish fillets and fillet blocks was greatly improved when treated with a mixture of sodium and hexametaphosphates, sodium erythorbate, and salt.

FOR ADDITIONAL INFORMATION: Contact: Office of Research and Technology Applications, Mail Stop (D), Room 3316, NOAA, FB No. 4, Suitland, Maryland 20233; (301) 763-2419.

0030 Sea Surface Temperature Maps for Fishermen

Department of Commerce, Washington, DC.

Feb 84 *(E, J)*

Fishermen have found that surface and mid-water species often tend to congregate in the vicinity of the boundaries of water masses of different temperatures, clarity, or salinity. Surface temperature fronts are visible to satellite-borne infrared sensors which map these areas of abrupt major changes. For several years NOAA has been using its remote-sensing technology to produce large-scale Oceanographic Analysis Charts of the Gulf Stream and related eddies on a weekly basis. Such information already has proved useful to pelagic fishermen--namely, those in pursuit of swordfish, tuna, marlin, and shark--who find oceanic fronts to be productive waters. Knowledge of the location of these strong thermal gradients prior to leaving the dock can guide fishermen more accurately than sophisticated onboard electronic equipment. This major new technology is being adapted to aid recreational and commercial fishermen. Regional analyses of sea surface temperature conditions for certain times and dates are produced using data from NOAA satellites that detect infrared radiation emitted from the sea surface.

FOR ADDITIONAL INFORMATION: Contact: NOAA Office of Research and Technology Applications, Mail Stop (D), Room 3308, FB 4, Suitland, Maryland 20233; (301) 763-2419.

0031 Smoked Fishery Products: Increasing Safety and Acceptability

Department of Commerce, Washington, DC.

Mar 84 *(E)*

Botulism outbreak from processed fishery products, such as smoked fish, have not only involved human health but have also had a detrimental economic effect on the industry involved. The Northwest and Alaska Fisheries Center has undertaken research to develop processing and storage guidelines that can be used to increase the safety of hot-smoked fishery products in cases of product temperature abuse during distribution or at the consumer level. The studies include the efficacy of salt and other preservatives as inhibitors of Clostridium botulinum under different processing times and temperatures and storage conditions. However, the salt levels are not acceptable to most consumers. Therefore, a study of additional inhibitors which will increase both the acceptability and safety of these products has been initiated.

FOR ADDITIONAL INFORMATION: Contact: Office of Research and Technology Applications, Mail Stop (D), Room 3316, NOAA, FB No. 4, Suitland, Maryland 20233; (301) 763-2419.

Solar Drying of Sludge: Greenhouse Versus Open Bed: The protection greenhouses afford against rain may not be necessary

See 0432

Special Primate Specimens Are Now Available

See 0888

Standardized Procedures for Planting Vegetation on Completed Sanitary Landfills

See 0433

0032 Tool For Rangeland Management and Research Is Developed

Department of Agriculture, Washington, DC.

May 84 *(E)*

A computer model is being developed to aid in both range management and research. An initial version of the model will soon be available for use by scientists and for limited application by resource managers. Simulation of Production and Utilization of Rangelands (SPUR) is a physically-based computerized model designed for application to a wide range of conditions. As a management tool, its purpose is to help provide a basis for management decisions by simulating plant growth, livestock production, runoff and erosion. As a research tool, its function is to help identify research needs, enhance the organization and transference of information, and provide a focus for future range research.

FOR ADDITIONAL INFORMATION: Copies of the publication describing the model and its applications can be obtained on request by writing J. Ross Wight at the Northwest Watershed Research Center, 1175 South Orchard, Boise, Idaho 83705. Ask for Miscellaneous Publication Number 1431.

ATMOSPHERIC & ASTRONOMICAL SCIENCES

Determining Frost Depth and Density: A simple device determines frost density from the volume of the melted frost
See 0464

0033 Environmental Satellite Data and Information
Department of Commerce, Washington, DC.
May 84 *(E, J)*

The Satellite Data Services Division (SDSD) of the National Climatic Data Center (NCDC) manages a data base of environmental satellite data and information and provides products from this data base to requesters. The data base includes data from NOAA's operational environmental satellites and selected data from various National Aeronautics and Space Administration (NASA) research satellites and the Department of Defense Meteorological Satellite Program (DMSP). While much of the data is nominally meteorological, its oceanographic applications have been very extensive, and the data and information has been of interest to agronomists, hydrologists, and geologists as well.

FOR ADDITIONAL INFORMATION: Contact: Mr. Ed Tiernan, NOAA/NESDIS/ORTA, FB 4, Room 3316, Washington, Maryland 20233; (301) 763-2419.

0034 Environmental Satellite Data Made More Effective
Department of the Navy, Washington, DC.
Jul 84 *(B)*

The AN/FMC-2(A) system was designed to allow the synergistic use of satellite data and conventional environmental observations and analyses. The goal is to provide a device which will expedite the implementation of satellite data into the Navy's environmental support system. The original requirement of the system was for an improved satellite display capability and has been expanded to a capability to access and superimpose data onto the satellite imagery. In addition the problems of dial-up capability through commercial telephone lines and the over demand on the system's resources by the real-time acquisition of the satellite data have been addressed and solved. The system consists of two modules, a communications front-end and an interactive graphics system connected through a high-speed bus.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, Virginia 22448. Refer to 090301.

0035 Frost Forecasting for Fruitgrowers: Progress in forecasting from satellite data is reviewed
National Aeronautics and Space Administration, Washington, DC.
Oct 84 *(E)*

Data from satellites can be displayed in color and used to predict frost and thus can be a valuable aid to agriculture. Although satellite frost prediction has had modest success in limited, intrastate regions, much remains to be done before an effective prediction system is available nationwide.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: NASA-CR-166827/NAC, price: $22.

0036 Processing and Enhancement of Weather Radar Data
Department of Commerce, Washington, DC.
May 84 *(A)*

The National Weather Service has developed an automated system to process and enhance data from weather radars for meteorological and hydrological applications. The system consists of a minicomputer to input and process radar data at programmed intervals (RADAP II System) and a micro-processor sub-system to generate and display the products in color graphics form (ICRAD System). IRCAD applications software is written in Microsoft Fortran. The color graphics functions are implemented with Fortran subroutines supplied as a relocatable library. The entire applications package runs under Northstar tailored CP/M. The meteorological applications supported by the system include the following: (1) reflectivity intensity map covering radar umbrella, (2) high resolution reflectivity intensity for individual storms, (3) maps of rainfall accumulations for different time intervals, (4) map of height of echo tops, (5) severe weather probabilities of storms, (6) user interactive determination of movement of storms, (7) time lapse looping of up to 15 versions of a user selected product, and (8) user generated and real-time selectable color tables and map backgrounds. This information is provided to assist those who may be interested in developing such a system for their own use.

FOR ADDITIONAL INFORMATION: Contact: NOAA/NESDIS/ORTA, FB 4, Room 3316, Suitland, MD 20233; (301) 763-2430.

Pyrheliometer With Improved Accuracy, Instrument maintains components at constant temperature and allows tenfold improvement in instrumental accuracy
See 0553

Rain and Dew Detector: Moisture between fingerlike electrodes actuates a simple alarm circuit
See 0554

Searching for Clear-Air Turbulence: An airborne microwave system would locate the tropopause to assist in the avoidance of clear-air turbulence
See 1019

0037 Simulating Atmospheric Turbulence: Dimensionless time series for gusts and gradients have been calculated with a model
National Aeronautics and Space Administration, Washington, DC.
Dec 84 *(J)*

A mathematical model for atmospheric turbulence simulates instantaneous gusts and gust gradients along a flightpath. Developed to predict the effects of atmospheric turbulence in horizontal and near-horizontal flight during the return of the Space Shuttle, the model is also applicable to commercial aviation. On the basis of the model, which is nondimensional and nonrecursive, dimensionless time series for both gusts and gust gradients were generated and stored on a set of magnetic tapes. The tapes represent atmospheric turbulence from ground level to an altitude of 10,000 meters.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25850/TN.

BIOMEDICAL TECHNOLOGY & HUMAN FACTORS

0038 Acoustic Tooth Cleaner: An acoustically-energized water jet aids in plaque breakdown

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(E, F)*

An acoustic tooth cleaner designed at Langley Research Center may help provide thorough daily dental cleaning to prevent calculous buildup. The technique will remove food particles and aid plaque breakdown with mild abrasive particles acoustically agitated in a water suspension by an acoustic wand. The new technique uses a solution of water containing a mild abrasive, which is pumped through a tube joining a powerline to an acoustic wand inserted in the mouth. The wand itself incorporates an acoustic transducer (e.g., piezoelectric, magnetostrictive, or electromagnetic) to generate high-frequency acoustic waves.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to Howard J. Osborn, Langley Research Center, Mail Code: 279, Hampton, VA 23665; (804) 827-3725. Refer to LAR-12471/TN.

0039 Adjustable Walker for the Handicapped: The front legs adjust at the touch of a lever for use on stairs or ramps

National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(E, F)*

A walker for the handicapped has adjustable front legs for negotiating ramps and stairs. It is superior to conventional fixed-leg walkers, which are awkward to use on inclines or irregular surfaces. The user adjusts the two front legs as necessary simply by operating a lever located at the top of the walker. The legs are spring-loaded at the top so that when the lever is depressed, the spring pushes the legs down. The legs are automatically locked in place when the lever is released, by a spring-loaded wheel similar to the balance wheel of a clock. The walker can be fabricated from metal or from lightweight composites.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB84-925512, price code E02.

0040 Air Force Develops Subjective Workload Assessment Technique

Department of the Air Force, Washington, DC.
Feb 84 *(A, E)*

The subjective workload assessment technique (SWAT) was designed to provide an easily administered subjective scaling method to be used to quantify workload in the cockpit and in other operator stations. The SWAT procedure is undergoing systematic development and validation in order to ensure its general applicability and to provide data regarding validity, reliability and sensitivity of the measure. Workload, as defined for SWAT, is composed primarily of time load, mental effort load, and stress load. SWAT is applied in a two-phase process. During the scale development phase, the person is asked to rank-order a set of cards composed of levels of the three dimensions (i.e., time, effort and stress). The individual's rankings of these sets of descriptions are then analyzed. The SWAT scale is tailored to each individual's conceptualization of how these three factors combine to create the subjective impression of workload. Laboratory studies have been conducted that demonstrate that SWAT does reflect changes in workload. A software package has been developed for use in specifying workload associated with a system or event. Modifications to this software are being made to refine the procedure for implementation in other environments.

FOR ADDITIONAL INFORMATION: Contact: Gary B. Reid, AFAMRL/HEG, Wright-Patterson AFB, OH 45433; (513) 255-2558.

0041 Binocular Overlap in a Fiber-Optic Helmet-Mounted Display Has Been Completed

Department of the Air Force, Washington, DC.
Nov 84 *(B, E)*

The first behavioral research and development project with the breadboard fiber-optic helmet-mounted display (FOHMD) has been completed at the Operations Training Division of AFHRL. Target detection, motion detection, and flight performance were compared under conditions of 25 and 45 degree binocular overlap using only the low-resolution background channels of a fiber-optic helmet-mounted display. In two experiments experienced fighter pilots viewed aircraft targets that either approached the pilots' view head-on or moved vertically in the field of view, at various angles of off-axis eccentricity. The results indicated that target motion detection with binocularly displayed targets were superior to those of monocularly displayed targets.

FOR ADDITIONAL INFORMATION: Contact: T.M. Longridge, AFHRL/OTE, Williams AFB, AZ 85224; (602) 988-6561.

0042 Cochlear Implants May Allow Some Deaf People To Hear

Department of Health and Human Services, Washington, DC.
Dec 84 *(E)*

A wire coil electrically stimulates nerve endings in the inner ear, bypassing the unresponsive tissue. It is a component of one of the most recent versions of a device known as the cochlear prosthesis. At present only people who are totally deaf are candidates to receive these experimental devices. The sounds 'heard' by these patients may be markedly different than those heard naturally.

FOR ADDITIONAL INFORMATION: Additional reading: An overview of the electronic cochlear prosthesis; clinical and research considerations. Otolaryngologic Clinics of North America 16:209-215, 1983. Other information may also be obtained from Research Resources Information Center, 1601 Research Blvd., Rockville, MD 20850; (301) 984-2870.

0043 Computer Analysis of Eye Blood-Vessel Images: Technique rapidly diagnoses diabetes mellitus

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(E)*

A computer technique for diagnosing diabetes mellitus automates a grid-scanning procedure previously done manually. Photographs of the 'whites' of patients' eyes are scanned by a computerized image analyzer programed to quantify the density of the small blood vessels in the conjunctiva. Comparison with a data base of known normal and diabetic patients facilitates rapid diagnosis.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15527/TN.

0044 Device Developed to Treat Head and Neck Tumors

Department of Health and Human Services, Washington, DC.

Mar 84 *(E)*

A novel method of delivering radiation therapy to certain patients with malignant head and neck tumors is being used by researchers at the National Cancer Institute (NCI) working in conjunction with scientists and clinicians at the National Institute of Dental Research (NIDR). The technique involves the use of an acrylic device, containing radioactive metallic seeds, that is made to fit externally over a patient's tumor. These appliances, called external-mold bite devices, are designed in collaboration with physicians and radiation physics scientists. Each device consists of an intraoral mouthpiece on which the patient bites to provide proper positioning and stabilization, plus an extension that fits over the tumor to be treated. A major advantage of the device is that radiation can be delivered directly to the tumor mass with reduced exposure to normal tissue in adjacent sites. The technique is also adaptable and can be used in conjunction with other types of treatment, such as chemotherapy and surgery.

FOR ADDITIONAL INFORMATION: Contact: National Cancer Institute, National Institutes of Health, Building 31, Room 10A29, 9000 Rockville Pike, Bethesda, MD 20205; (301) 496-6631.

0045 Digital Filter for Detecting Infectious Diseases: Low-speed, low-pass filter extracts information from noise-obscured data

Department of Energy, Washington, DC.

Mar 84 *(E, K)*

A low-pass, nonrecursive digital filter developed for an automated enzyme immuno-assay system eliminates a problem of noise-obscured data. These data are recorded by the Technicon Autoanalyzer II at the Los Alamos National Laboratory. The analyzer processes 240 unique serum samples per hour in a serodiagnosis of infectious diseases in animals. Essentially the low-pass digital filter corrects voltage spikes to correspond to the optical density of the particular serum sample. The controller first digitizes the colorimeter output and stores the results in an array. The array then is processed by the software-implemented digital-filter algorithm and is finally analyzed for the peak value.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-009728, price code: A02. For information not provided, contact R. R. Brown, Los Alamos National Laboratory, MS 957, P.O. Box 1663, Los Alamos, NM 87545; (505) 667-3278.

0046 Effectiveness of Cooling Garments: Water-cooled vests with portable heat exchangers are evaluated

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 84 *(E)*

A report discusses the performance of two liquid-cooled undergarments. One undergarment provides cooling over the torso of the wearer. The other provides cooling over the torso and head. The cooling effect was measured in tests on a life-size manikin, conducted by the U.S. Army Research Institute of Environmental Medicine. The liquid in both undergarments was cooled by circulating it through a heat exchanger in an ice-filled compartment.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A133174/NAA, price code: A02.

0047 Evaluation Tests for Cold-Weather Clothing: Performance and durability are measured

Army Materiel Development and Readiness Command, Alexandria, VA.

Jul 84 *(H, K)*

Several test procedures have been developed for evaluating the durability and protective qualities of clothing designed for cold weather. The procedures were prepared by the U.S. Army Test and Evaluation Command and are applicable to any form of protective cold-weather clothing. The primary tests consist of evaluating the cold protection quality of the garment during both active and inactive use. Guidelines are also given for measuring thermal durability, which is the effect of aging and wear on the insulating properties of the garment, and physical durability.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A130482/NAA, price code: A03, or contact project officer Wolfgang Schmidt (301) 278-3677.

0048 FDA Testing Of Medical Devices

Department of Health and Human Services, Washington, DC.

Dec 84 *(E)*

The Division of Medical Engineering of the Food and Drug Administration (FDA) identifies the causes of malfunctions in a wide variety of medical devices, ranging from wheelchairs to kidney dialysis systems. The analytical service is part of the division's primary mission to support the FDA Center for Devices and Radiological Health--the Federal Government's regulatory agency for overseeing medical devices. Researchers may consult with the division staff about medical device failures. If necessary, the device may be checked by the staff at the division's laboratory or at the host institution. Inhouse laboratory capabilities applied when testing devices include scanning and transmission electron microscopy, energy-dispersive X-ray spectroscopy, and holographic interferometry.

FOR ADDITIONAL INFORMATION: Contact: Mr. Ed Mueller, Division of Medical Engineering, Food and Drug Administration, South Agriculture Building, Room 6159, 14th Street & Independence Avenue, S.W., Washington, D.C. 20250; (202) 447-2468.

0049 Heart-Rate and Breath-Rate Monitor: Off-the-shelf components measure physiological rates to an accuracy of 1 pulse/minute

National Aeronautics and Space Administration, Washington, DC.

Jun 84 *(B, E)*

A circuit requiring only four integrated circuits (IC's) measures both heart rate and breath rate. The dual-rate-measurement circuit has performed satisfactorily in practical clinical situations. The basic element--an inexpensive phase-locked-loop IC (4046)--is used to generate a linear output signal proportional to the input rate. This component is commercially available and is particularly suitable for making biomedical measurements. The simplicity of the circuitry, fast response time, good linearity, and good stability are desirable features achieved with this technique.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to James O. Harrell, John F. Kennedy Space Center, Mail Code: SA-PAT, Kennedy Space Center, FL 32899; (305) 867-2544. In either case refer to MSC-20078/TN.

0050 Heat Absorbing Gel Developed

National Aeronautics and Space Administration, Washington, DC.

Sep 84 *(C, E)*

Technology developed during the design of cooling systems for space suits has been applied to cooling of sportswear for athletes. The main components are a patented refrigerator-cooled cartridge that slips into insulated pockets in the clothing plus a special absorbent, blended fabric. This cooling system makes it less tiring to perform strenuous activities by removing excess body heat from such areas as the forehead, neck or wrists where heat transfer is particularly efficient. Many athletes have reported dramatic improvements in their performance in hot weather when using garments like head bands, wrist bands, visors, and caps. The garments resulted from the combining of bio-engineering, cooling technology, and modern fabrics. The principal element of the cooling system -- the gel cartridge -- is a more efficient version of the 'blue ice' pack sold for picnic coolers. One cartridge can remove as much as 200 BTUs of heat per hour, which is 70% of the heat produced by the body at rest. After chilling they are inserted into the insulated pockets of the garment between a reflective-coated heat shield and an inner cloth surface. Typically, cartridges used by runners in extremely high temperatures last 45 minutes or more when the garment is dry. The major users of this cooling technology are found among joggers and runners. Other users are found among tennis players, cyclists, football players, or among oil field workers who work where ground temperatures can exceed 137 degrees F. In such cases, the cooling packs work as personal air conditioners. In a medical application, the cooling packs can be applied to various injuries as a means to reduce swelling. Another interesting application is found in cold environments rather than in hot, since the gel cartridges work as effectively in reverse direction. When heated to 150 degrees F, the cartridges can be used as warmers, for example by skiers.

FOR ADDITIONAL INFORMATION: Contact: TECTRA fact sheets, School of Business and Public Administration, California State University, Sacramento, CA 95819; (916) 454-6640. Refer to Case C08-25/TN.

0051 Implanted Defibrillator Improves Survival Rate of Cardiac Patients

Department of Health and Human Services, Washington, DC.

Apr 84 *(E)*

A surgically implanted device that normalizes the rhythm of a patient's failing heart has significantly reduced the death rate of some high-risk cardiac patients, according to results from several studies. The device, an implantable automatic defibrillator, prevents sudden death caused by ventricular arrhythmias (VA's)--rapid, erratic heartbeats that cripple the heart. Using electrical pulses controlled by computer, the defibrillator stops the VA's before the heart ceases to pump.

FOR ADDITIONAL INFORMATION: Research is described in 'Annals of Internal Medicine 98(Part 1)', 585-588, 1983. Or, contact Mr. Ed Post, National Institutes of Health, Research Resources Information Center, 1776 East Jefferson Street, Rockville, MD 20852; (301) 881-4150.

Improved Heavy-Ion Linac: Radio-frequency quadrupole linac biomedical and nuclear research potentials

See 0973

0052 Instrument is Developed for Ramp Injection of Radiotracers for Blood Flow Measurement by Emission Tomography

Department of Energy, Washington, DC.

Jul 84 *(E, K)*

An instrument based on coincidence detection of annihilation radiation was built to control the arterial concentration of a radionuclide as a uniformly increasing ramp function over a preset injection interval (ranging from 1.6 minutes to 13.6 hours). The device was designed to accommodate radionuclides of different physical and biological halflife, and the physiological characteristics of the system being studied. The instrument was designed to permit determination of blood flow with emission tomography. A prototype has been developed and is in routine use. A microprocessor controlled unit is being constructed. A single detector (non-coincident) device is contemplated that will accommodate ramp, linear and nuclear medicine with position emission tomography (PET), and single photon emission computed tomography (SPECT) in both clinical applications and research. U.S. Patent 4,409,996 has been issued.

FOR ADDITIONAL INFORMATION: Contact: W. Marcuse, Office of Research and Technology Assessment, Brookhaven National Laboratory, Upton, Long Island, New York 11973; (516) 282-2103.

0053 Laser Treatment May Prevent Blindness for Some Victims of Histoplasmosis

Department of Health and Human Services, Washington, DC.

Jun 84 *(E)*

The results of a National Eye Institute (NEI)-supported clinical trial demonstrating that laser treatment can prevent serious visual loss in some people with presumed ocular histoplasmosis syndrome (OHS) were recently announced. In this national collaborative study of people who were in danger of losing vision because of OHS, laser treatment cut in half their risk of losing all central vision.

FOR ADDITIONAL INFORMATION: Contact: National Eye Institute, Bldg. 31, Room 6A25, 9000 Rockville Pike, Bethesda, MD 20205.

0054 Lightweight, Economical Device Alleviates Drop Foot: Corrective apparatus alleviates difficulties in walking for victims of drop foot

National Aeronautics and Space Administration, Washington, DC.

Sep 84 *(E)*

Many people suffer from what is termed a 'drop-foot' condition, which impairs their ability to walk. This term is used to indicate the loss of the ability to control the foot with the muscles that normally operate the ankle. A new device consists of an adjustable, comfortable leather legband that girdles the leg above the calf and retains and supports the ankle joint with a flexible ligament connected to the toe of the shoe. This device provides the flexibility and support to alleviate the drop-foot condition. It is very inexpensive, costing less than $1 for the basic device and less than 1 cent for each shoe adapted for the device. It is lightweight.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: LAR-12259/TN.

0055 Microcomputer Multiplexes Alphanumeric Labels on CRT's: External, low-power alphanumeric label generator eliminates costly video circuitry

National Aeronautics and Space Administration, Washington, DC.

Aug 84 *(A, B, E)*

A cathode-ray-tube (CRT) control system generates and multiplexes alphanumeric characters with continuously-varying analog waveforms. Designed to display simultaneous electrocardiogram waveforms with vital sign digital displays, the system generates vertical, horizontal, and intensity control signals to the CRT and adapts to most CRT equipment. The display of each alphanumeric character is formatted in a 5-by-7 dot matrix and generated by a ramp-raster technique. Although similar CRT displays are based on this technique, the application of an independent, low-power microprocessor with simple user programing and peripheral control circuits to a CRT display control system is unique. Advantages of this control system include low power consumption, insensitivity to power-supply variations, wide adaptability, and relatively simple circuits and programing.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20079/TN.

0056 Microprocessor-Based Neural-Pulse-Wave Analyzer: Contributions from several nerve units are identified and separated

National Aeronautics and Space Administration, Washington, DC.

Jun 84 *(B, E)*

A microprocessor-based system analyzes the amplitudes and rise times of neural waveforms. By displaying histograms of the measured parameters, it helps researchers determine how many nerves are contributing to a signal and to specify the waveform characteristics of each. Tests using simulated nerve signals and real signals from the otolith nerve of a frog show the system to be effective in analyzing the noisy, multiple-source neural pulse signals.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: ARC-11388/TN.

0057 Microwave Spectrometer Developed

Department of the Navy, Washington, DC.

Oct 84 *(E, J)*

A microwave spectrometer, developed at the Naval Medical Research Institute (NMRI), Bethesda, Maryland, is designed to allow the investigation of the effects of microwave on biological material while the field is either on or off.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, VA 22448. Refer to 090603/TN.

0058 New Designs Have Been Developed for Personal Lifts

Veterans Administration, Washington, DC.

Jun 84 *(E, F)*

For many physically disabled people, a lift is required for transfers in and out of a wheelchair. The most commonly used lifts are large, heavy and difficult to maneuver. Despite these liabilities, current designs present a simple solution that works well. Over the past few months, researchers have attempted to develop a design for a personal lift that retains the desirable features of simplicity and efficiency while avoiding the problems of size and weight. One design replaces the heavy metal construction of standard lifts with lightweight reduction without sacrificing strength or stability. The basic design of the lift was retained for its simplicity and efficiency. The other design completely replaces current lifts. It attempts to combine the functions of both a lift and a powered wheelchair. The 'Lift Chair' is based on a standard, powered wheelchair chassis. Instead of being integral to the chassis, the seat is mounted on a vertical post. This allows the seat to be rotated through an angle of 180 degrees. A detachable boom is mounted to the vertical post.

FOR ADDITIONAL INFORMATION: Contact: Dr. John Trimble, Hines VA Hospital, P.O. Box 20, Hines, IL 60141, (312) 343 7200.

0059 New Monitor Allows Evaluation of Hyperactive Children

Department of Health and Human Services, Washington, DC.

Oct 84 *(E, K)*

A unique activity monitor is helping National Institute of Mental Health (NIMH) scientists verify that hyperactive children are more active than normal children--even during sleep. Weighing only 2 1/2 ounces, the monitor uses a pair of computer memory chips to record hourly activity levels for up to 240 hours. Worn either in a pouch suspended from a belt or like a wrist watch, the monitor was developed by two NIMH engineers. It provides a continuous and objective method for measuring the body's activity levels. In yet another clinical application of the monitor, NIMH's Dr. Thomas Wehr and his associates have monitored and obtained objective measurements of the activity of manic-depressive patients. Differences of up to 500 percent in the levels of motor activity and sleep in manic versus depressive states have been recorded.

FOR ADDITIONAL INFORMATION: Contact: Information Officer, ADAMHA-NIMH, 5600 Fishers Lane, Rockville, MD 20857; (301) 443-4536.

0060 New Portable Instrument Measures CO in Blood

Department of the Navy, Washington, DC.

Nov 84 *(E, J, K)*

Researchers of the Naval Medical Research Institute's (NMRI's) Biochemistry Division have recently developed the first portable instrument which provides a rapid, accurate measurement of carbon monoxide in the blood. A patent has been awarded for the design which incorporates the rapid spectrophotometric procedure into such a device. Known as the carboxyhemoglobinometer, it uses less than a drop of blood and provides a digital readout in 30 seconds and does not require calibration. Its portability and ease of operation will permit this instrument to be used anywhere in the field where there is a need to measure blood carbon monoxide levels. In addition to its shipboard application, the carboxyhemoglobinometer should be particularly useful to fire fighters, emergency room personnel, and workers at sites of chronic carbon monoxide exposure.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, VA 22448. Refer to 090702/TN.

0061 New Visual Aids Developed For Operational Pilots

Department of the Air Force, Washington, DC.
Feb 84 *(E)*

Though wearing glasses while flying is permitted, glasses present problems of safety, integration with personal protective equipment (especially chemical defense respirators), use of night vision goggles, stability under 'G' forces, fogging, and field of view. The U.S. Air Force School of Aerospace Medicine has three visual aid devices that minimize these problems: (1) polycarbonate lenses which resist shattering when impacted; (2) combat spectacle frames which can be worn underneath the chemical defense respirator; and (3) contact lenses which present no protective equipment integration problems, resist 'G' force destabilization, do not fog, and provide a wide field of view. Polycarbonate lenses may be used in eye protection in industry and police work. Combat spectacle frames are compatible with respirators for firemen, inspectors, etc. Contact lens studies are establishing parameter measurement techniques. Refractive corrections for airborne search and rescue are a by-product of the night vision goggles.

FOR ADDITIONAL INFORMATION: Contact: Lt. Col. Wayne Provines, USAF School of Aerospace Medicine/NGOP, Brooks AFB, TX 78235; (512) 536-2745.

0062 Portable Communicator Has Been Developed for Non Vocal People

Veterans Administration, Washington, DC.
Jun 84 *(B, E)*

Designing products that allow non-speaking people to communicate is a complex task. The ideal design must achieve a balance of several critical features. The product should incorporate voice synthesis for natural communication. Minimal effort should be required to create, edit and vocalize a message. Operation must be simple and easy to understand. The product must be portable, low-cost, and must offer a large vocabulary. Unfortunately these design features are often conflicting. A new design represents a compromise that incorporates the best features of all existing aids. The primary concern was the final cost. To keep cost low, the device is simple. The user creates messages one character at a time, using an oversized keyboard. As messages are created, they are shown on a simple 10-character display. Simple editing can be accomplished with a single keystroke. Although this requires more effort, the user can create any message he desires. Stored messages can be vocalized with a sequence of three keystrokes.

FOR ADDITIONAL INFORMATION: Contact: Dr. John Trimble, Hines VA Hospital, P.O. Box 20, Hines IL 60141 (312) 343-7200.

Portable Dental Chair Functions as a Total Care Unit
See 0881

Recycling Lithium Carbonate/Lithium Hydroxide Waste: A hazardous-waste disposal problem is eliminated by regeneration
See 0425

0063 Researchers Test Device to Aid Cardiac Patients

Department of Health and Human Services, Washington, DC.
Aug 84 *(E)*

Administering a short negative voltage pulse after the positive pulse applied to convert fibrillating hearts to normal rhythm might improve the survival rate of cardiac patients. About 40 to 75 percent of the patients receiving emergency defibrillation die, according to estimates published in 1980. One reason is the damage to heart tissue caused by the pulse of electricity that earlier saved lives. A second, negative pulse following immediately after the positive pulse helps seal the membranes.

FOR ADDITIONAL INFORMATION: Contact: Research Resources Information Center, 1601 Research Blvd., Rockville, MD 20850; (301) 984-2870.

Serological Detection of Antibodies to HTLV-III in Sera of Patients with AIDS and pre-AIDS Conditions
See 0885

0064 Serum or Plasma Specimens from Transfusion-Transmitted Viruses Study are Available

Department of Health and Human Services, Washington, DC.
Oct 84 *(E)*

Serum or plasma specimens collected during a National Heart, Lung, and Blood Institute (NHLBI) study of transfusion-transmitted viruses are available to intramural and extramural scientists. Approximately 100,000 coded specimens of 2.5 milliliters (ml) each are contained in the NHLBI repository. More than 12,000 samples have been dispensed to investigators since 1981. The specimens are used primarily to evaluate the accuracy of screening tests to detect diseases transmitted by the transfusion of blood or blood products. The serum or plasma specimens may be used in other areas of investigation--for example, to study the suspected blood transmission of oncogenic viruses and of agents responsible for chronic degenerative disorders.

FOR ADDITIONAL INFORMATION: Contact: Dr. Luiz H. Barbosa, Federal Building, Room 5C-10, Division of Blood Diseases and Resources, National Heart, Lung, and Blood Institute, National Institutes of Health, 7550 Wisconsin Avenue, Bethesda, MD 20205.

Sharp-Focus Composite Microscope Imaging by Computer: Enhanced depth of focus aids medical analysis
See 0561

Submarine Air Monitoring System Improved
See 0564

0065 Transducer Joint for Kidney-Stone Ultrasonics: Improved mounting allows joint to last long enough for effective treatment

National Aeronautics and Space Administration, Washington, DC.
Aug 84 *(E)*

Ultrasonic therapy for kidney stones is improved by a new way of connecting a wire-probe ultrasonic waveguide to its transducer. The nonsurgical disintegration of kidney stones by ultrasonic energy had previously been hampered by the tendency of the wire probes to break. The new mounting method prevents breakage, so that the disintegration can be completed. In the past, stresses induced in the wire by the 20-kilohertz ultrasound have broken the wire at the point of connection to the ultrasonic transducer after about 15 seconds of operation. A considerably longer period - about 1 minute - is needed to ensure that the stone is adequately disintegrated. A new way of supporting the wire at and near the transducer reduces deformations and stresses.

FOR ADDITIONAL INFORMATION: This invention is owned by NASA, and a patent application has been filed. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to John O. Tresansky, Goddard Space Flight Center, Mail Code: 204, Greenbelt, MD 20771; (301) 344-7351. Otherwise contact Technology Transfer Division, P.O. Box 8757, BWI Airport, MD 21240. In either case refer to GSC-12652/TN.

0066 Ultrasonic Transceiver Has Been Developed To Analyze Orthopedic and Neurological Problems

Veterans Administration, Washington, DC.

Apr 84 *(B, E, K)*

Researchers have developed a new gait-analysis mechanism that uses ultrasonic transmitters and receivers to study orthopedic and neurological problems. These mechanisms are attached to the patient's ankle. A calculation is made of the intervals of time between steps. This is then recorded on a chart. These charts are analyzed by doctors in a manner similar to the study of an electrocardiogram. A variety of abnormalties can be analyzed by these charts, and the doctor can determine the effectiveness of corrective procedures by matching before and after charts. The mechanism is contained in lucite blocks that are strapped on to the subject's ankle. The circuitry is contained in a pack that attaches to the subject's belt. A transceiver is used to convey the information so the patient will have freedom of movement. This new mechanism is called the Ultrasonic Stride Analyzer, and it is both inexpensive and easy to use. It is accurate enough to detect the gait of a subject who has one leg that is 1 cm shorter than the other.

FOR ADDITIONAL INFORMATION: Contact: Dr. John Trimble, Hines VA Hospital, P.O. Box 20, Hines, IL 60141; (312) 343-7200.

0067 Voice Operated Controls and Switches are Developed

Veterans Administration, Washington, DC.

Jul 84 *(B, E)*

Recent advances in voice recognition technology have provided low-cost integrated circuits capable of speaker-independent recognition of up to 16 words. Researchers have developed two devices to demonstrate the usefulness of this technology to disabled people. One device is called the voice-operated appliance control (VOAC). The VOAC allows its user to operate up to 256 electrical devices with three simple voice commands: 'go ahead,' 'search,' and 'stop.' The voice-operated switch (VOCALINK) is designed to replace the two-position switches used to activate many electrical devices for disabled people. These switches can be breath activated (sip/puff) or operated by small movements of the lips, tongue, forehead, arm, leg or foot. The two switch positions are replaced with the words 'go ahead' and 'stop.' These words can be used alone or in combination to control most devices. A third word, 'repeat,' can be used to repeat the basic control words or word combinations. This feature is particularly useful with devices that use scanning, such as TV remote controls. VOCALINK consists of two separate units: a voice recognition module and a control module.

FOR ADDITIONAL INFORMATION: Contact: Dr. John Trimble, Hines VA Hospital, P.O. Box 20, Hines, IL 60141; (312) 343-7200.

0068 Wheelchair Seat Suspension Has Been Developed

Veterans Administration, Washington, DC.

May 84 *(E, F)*

Road shocks and vibrations pose a crucial problem to users of unpowered wheelchairs. The severity of this problem can range from an annoyance to aggravation of pressure sores (decubiti). Many suspension systems have been posed to minimize this problem. The problem with most is that they require extensive modification of the wheelchair. Manufacturers are reluctant to adopt such designs. This design does not require such modifications to the wheelchair. Rather than adding suspension to the chassis, as in previous designs, researchers suspended the seat. This suspension is accomplished with spring-loaded, post-type shock absorbers located between the upper and lower parts of the wheelchair chassis. A shock absorber is located near each corner of the seat. The shock absorbers dampen vibrations to the lower frame.

FOR ADDITIONAL INFORMATION: Contact: Dr. John Trimble, Hines VA Hospital, P.O. Box 20, Hines, IL 60141; (312) 343-7200.

BUILDING INDUSTRY TECHNOLOGY

0069 Algorithm Developed For Best HVAC Start/top Times

Department of Commerce, Washington, DC.

Mar 84 *(C)*

A researcher at the National Bureau of Standards Center for Building Technology has developed a simple algorithm for determining the optimum times to start and shut down a building heating system and, with minor modifications, a cooling system. The algorithm is designed to be used with computerized energy management and control systems (EMCS). By delaying until the last possible moment the time the system starts and then shutting down the system as early as possible, the algorithm should help reduce energy consumption in lightweight, intermittently occupied buildings. Exact energy savings have yet to be determined.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB83-242222, price code: A04.

The Benefits of Thermal-Energy Storage: Residential sector using this technology may save an estimated 80 million barrels (12.7 x 10(6) m(3)) of oil annually by the year 2000

See 0304

0070 Computer Aided Structural Engineering Project Develops

Department of the Army, Washington, DC.

Mar 84 *(A, D)*

The Computer Aided Structures Engineering (CASE) project develops, in an orderly manner, computer-aided structural design/analysis programs. These programs are useful tools for any engineer involved in design and analysis of the type structures included in CASE. Twenty-seven programs have been developed for design/analysis of pile structures and sub-structures, sheet pile cells, generalized 3-D stability analysis, finite element analysis, reinforced concrete culverts and conduits, reinforced concrete T-walls, building system and blast resistance analysis. These programs have received extensive field testing. Other programs will be developed for miter gates, U-frame structures and other Corps structures besides extending the scope of the program already developed.

FOR ADDITIONAL INFORMATION: Contact: Dr. N. Radhakrishnan or Paul Senter, U.S. Army Engineer Waterways Experiment Station, P.O. Box 631, Vicksburg, MI 39180; (601) 634-2182.

0071 Computer Program Simulates Room Fires and Estimates Safet Egress Time

Department of Commerce, Washington, DC.
Mar 84 *(A, D)*

Researchers in the NBS Center for Fires Research are developing computer programs which will help fire safety engineers and others study many features of room fires. An initial program has been designed which simulates a fire in an enclosure and estimates the time occupants have to evacuate safely. Written in ANSI FORTRAN, the program is designed to be used by engineers on readily available computer hardware. Future programs will be more detailed and tailored to user's needs.

FOR ADDITIONAL INFORMATION: Contact: Dr. Leonard Cooper, A363 Polymers Bldg., National Bureau of Standards, Washington, D.C. 20204; (301) 921-3175.

0072 Criteria Has Been Established For Solar Heating And Cooling

Department of Commerce, Washington, DC.
Dec 84 *(C, D)*

Those in the building industry concerned with assessing the design and performance of solar energy systems in commercial buildings will be interested in a new publication issued by the National Bureau of Standards Center for Building Technology. Performance Criteria for Solar Heating and Cooling in Commercial Buildings (TN 1187) covers both passive and active solar heating, cooling, and hot water systems. Criteria dealing with health and safety concerns are discussed as well as criteria on various aspects of technical performance. A primary consideration is planning and design aspects different from those used in conventional buildings. Originally published by NBS in 1976 as interim criteria, the 229-page publication has been revised to include advances in the state-of-the-art of solar technology. The criteria are intended to be flexible to allow freedom of design and encourage innovation.

FOR ADDITIONAL INFORMATION: The publication is available for $7.00 prepaid from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Order by title and stock no. 003-003-02579-8.

0073 Daylighting Can Cut Energy Use

Department of Commerce, Washington, DC.
Mar 84 *(C)*

Skylights, when used to offset the need for electric lights, can reduce electric energy consumption by as much as 77%. That is one of the conclusions reached by National Bureau of Standards researchers in a computer-simulated study of the daylighting and energy performance of skylights, clerestories, and windows in a one-story, 2500 square foot commercial building in Washington, D.C. The conclusions are limited to similar buildings in climates like Washington's. NBS looked at 31 fenestration options; in all cases, where daylighting was used, the total building energy was reduced.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB83-240481, price code: A03.

Designing Glass Panels for Economy and Reliability: Method considers such factors as glass temper and load duration
See 0767

Earth as a Residential Heat-Storage Medium: Heat is stored during hot months for use during cold months
See 0320

Edge Supports for Photovoltaic Modules: Mounting strips are patterned after glazing gaskets
See 0321

Estimating Design Loads in Coupled Vibrating Structures: Approximate spectral analysis is faster and less expensive than transient analysis
See 1001

Figuring Residential Energy With Pocket Calculator: Consumption for heating and cooling can be calculated quickly and easily
See 0329

0074 Flexible Vinyl Strip Doors Decrease Heat Loss

Department of the Navy, Washington, DC.
Feb 84 *(C, D)*

Tests conducted by the Naval Civil Engineering Laboratory (NCEL), Port Hueneme, Calif., demonstrate that flexible vinyl strip doors can decrease heat loss and increase comfort in large open-door buildings, such as hangars and warehouses. Flexible vinyl strip doors can be either header (lintel) mounted or wall mounted. Header mounts bolt inside door frames to the door header (lintel). Wall mounts bolt to the interior wall and are the preferred mounting to reduce risks of vehicles striking and damaging the mounts. Published results of the tests include equations for calculating reduction in air leakage, pressure differences for wind speeds below 30 mph, and energy savings obtained. Mounting configurations are also provided.

FOR ADDITIONAL INFORMATION: Contact: Navy Technology Transfer Fact Sheet, Code E411, Naval Surface Weapons Center, Dahlgren, VA 22448. Refer to 080904.

Fuel-Saving Oil Burners for Homes: Two approaches to improving the efficiency of furnaces and adapting them to lower heat demands are described
See 0641

Guide to Calibrating Temperature Devices is Available
See 0490

How To Build a Solar Space Heater for Your Own Home: Do-it-yourself manual shows how to make inexpensive solar panels that slash heating bills
See 0339

0075 Instrumentation for an Energy-Conserving House: Sensors, data logging, and data processing are described

Department of Energy, Washington, DC.
Apr 84 *(B, K)*

A report describes instrumentation in the Brookhaven Natural Thermal Storage House in Upton, New York. The Brookhaven house is a superinsulated, energy-conserving structure containing a variety of heat-conservation and passive solar-heating features. These include highly insulated walls, triple-glazed windows, insulated basement and crawl space, Trombe wall, and sunspace. The house is fully instrumented. Probes, including thermistors, dew-point sensors, wind direction and velocity meters, and pyranometer, are specified. The instrumentation determines energy input, utilized heat, and thermal losses for the house. Energy input comprises electrical heating and solar heating.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-000267, price code: A02.

0076 Insulation Deficiencies And Their Effects On Heat Loss In Housing

Department of the Navy, Washington, DC.
Dec 84 *(C)*

Good insulation installation practices reduce void areas and help minimize heat loss from buildings. Contrary to accepted belief in the construction industry, NCEL determined that the percentage loss in efficiency of insulation is as much as four times greater than the percentage of voids. Factors investigated included: (1) the effect of voids left inadvertently during insulation installation in walls and ceilings of buildings and (2) methods for determining insulation void areas in order to retrofit insulation.

FOR ADDITIONAL INFORMATION: Contact: Charles R. Miles, Code L63, Naval Civil Engineering Laboratory, Port Hueneme, California 93043; (805) 982-5975. Refer to Techdata Sheet 84-09/TN.

0077 Low-Temperature Plenum System Used for Firefighting Training Smoke Generators

Department of the Navy, Washington, DC.
Aug 84 *(D)*

A low-temperature/low-pressure plenum system, introduced at the Naval Training Equipment Center, Orlando, Florida, permits control of a high-capacity smoke generator system with independent flow control from the plenum to a plurality of outlet ports at a number of trainer locations. The lower temperature distribution on the plenum chamber surfaces avoids the problem of chemical decomposition of residue on such surfaces, whereas such decomposition currently occurs. The low-pressure system allows for the simplification of piping and valving, and accordingly can reduce costs. Smoke control is provided independently from smoke generator control for a more flexible control of smoke flow rates.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, Virginia 22448.

Low-Temperature Solar-Energy Systems: High efficiency is possible for industrial applications
See 0353

Magnesium Polyphosphate Cement Concrete: Concrete repair material for use under wet conditions and temperature extremes
See 0150

National Appropriate Technology Assistance Service Established: The service provides engineering, scientific and commercialization technical assistance for energy-related technologies
See 0357

0078 Nonlinear Stress Concrete Structures Program

Department of Energy, Washington, DC.
Dec 84 *(A, D, H)*

NONSAP-C is a finite element program for determining the static and dynamic response of three-dimensional reinforced concrete structures. Long-term, or creep, behavior of concrete structures can also be analyzed. Nonlinear constitutive relations for concrete under short-term loads are incorporated in two time-independent models, a variable-modulus approach with orthotropic behavior induced in the concrete due to the development of different tangent moduli in different directions and an elastic-plastic model in which the concrete is assumed to be a continuous, isotropic, and linearly elastic-plastic strain-hardening-fracture material. A viscoelastic constitutive model for long-term thermal creep of concrete is included. Three-dimensional finite elements available in NONSAP-C include a truss element, a multinode tendon element for prestressed and posttensioned concrete structures, an elastic-plastic membrane element to represent the behavior of cavity liners, and a general isoparametric element with a variable number of nodes for analysis of solids and thick shells.

FOR ADDITIONAL INFORMATION: Contact: NTIS Computer Products Center, National Technical Information Service, Springfield, VA 22161; (703) 487-4763. Refer to DE83-048974/TN.

Preventing Moisture Damage to Bituminous Materials: Damage inhibitor is abundant in shale oil
See 0152

Quick-Setting Polymer Concrete: High strengths are obtained using a water-soluble binder
See 0153

0079 Reducing Housing Moisture Damage In Humid Climates

Department of the Navy, Washington, DC.
Sep 84 *(D)*

Walls constructed of hollow concrete masonry with inside furring, insulation, and gypsum drywall finishes are especially vulnerable in semitropical and tropical climates. Drywall finishes become waterlogged, softened, and covered with mildew. Paint blisters or peels off. Condensation often collects on floors near exterior walls, damaging carpeting and furniture. Recent extensive field studies and tests conducted by Naval Civil Engineering Laboratory (NCEL) revealed that water from sources such as wind-driven rain, uncontrolled lawn sprinklers, and accumulations at grade level actually collects and is stored in the hollow cavities of concrete masonry wall blocks. In hot, humid climates where interior spaces are cooled by air conditioning systems, water vapor actually 'drives' inward and often condenses on the colder outer faces of interior wallboards or wets insulation materials in furred spaces.

FOR ADDITIONAL INFORMATION: Contact: Spencer R. Conklin, Code L52, Naval Civil Engineering Laboratory, Port Hueneme, CA 93043; (805) 982-5793.

0080 Reliability Guidelines for Solar Hot-Water Systems: Document consolidates available information in one publication

Department of Energy, Washington, DC.

May 84 *(C, D)*

A report provides solar-energy-system engineers, designers, and manufacturers with the concepts and techniques they need to develop reliable, solar domestic hot-water systems. The emphasis is on reliability, not on sizing, design, or installation. The report describes the minimum instrumentation required to determine whether a domestic hot-water system is operating properly. It furnishes detailed information on starting up systems and troubleshooting them. The document includes evaluations of the reliability of six basic types of solar domestic hot-water systems: draindown, drainback, circulating-water, thermosiphon, antifreeze, and air systems. An appendix contains a FORTRAN computer program for estimating the scaling potential of local water supplies. Although the program is written for a large-scale computer, the equations can be programed for use on hand-held calculators. If scaling is predicted, water-treatment techniques should be investigated and implemented. The report is intended primarily for the solar-energy-system manufacturing industry. However, do-it-yourselfers may find it useful for selecting reliable components and in starting up, troubleshooting, and maintaining their systems.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-016180, price code: A12. For information not in the report, contact William Schertz, Argonne National Laboratory, 9700 South Cass Ave., Argonne, IL 60439; (312) 972-6230.

Self-Modulated Laser Rangefinder: Longitudinal resonance modes are exploited

See 0560

0081 Solar Energy Studies Computer Program Developed

Department of the Army, Washington, DC.

Jun 84 *(A, C)*

The US Army Corps of Engineers Construction Engineering Research Laboratory has developed an interactive, user-friendly computer program for estimating the economic feasibility of an active solar thermal energy system early in the building design process. Known as SOLFEAS, the purpose of the program is to provide the building designer with a quick, simple, and inexpensive procedure for making an initial assessment of a solar system cost effectiveness for the facility under consideration. In addition, the method is sufficiently flexible to account for future variations in the discount rate, fuel costs and escalation rates, and assumed system maintenance and repair costs. SOLFEAS is capable of projecting paybacks for each of four distinct solar system types, service water heating, space heating only, combined space/domestic water heating, and combined space/service water heating/space cooling. The only user inputs required by the program are a site number corresponding to the site location of the study and the monthly total space heating, cooling and service hot water loads for the facility under consideration. The program can automatically compute the system-installed cost as a function of collector area for each of the four system types. SOLFEAS also computes the savings for each candidate collector area and outputs this parameter for user inspection.

FOR ADDITIONAL INFORMATION: Contact: Dr. David M. Joncich, (217) 373-7281, or toll-free 800/USA-CERL (outside Illinois), (800) 252-7122 (within Illinois), or write to US Army Corps of Engineers, CERL, P.O. Box 4005, Champaign, IL 61820.

Solid-State Ballasts for Fluorescent Lamps: Major savings in lighting energy can be realized

See 0289

0082 Training Simulator for Fire Management: Users manipulate resources in practicing fire-control strategy

National Aeronautics and Space Administration, Washington, DC.

Nov 84 *(K)*

Management of people and equipment at a fire can be practiced on a simulator that consists of readily-available hardware and NASA-developed software. Users (generally fireground commanders) manipulate resource information that is displayed on two separate monitors, as computer-generated messages and computer-controlled fire scenes. The 'decision tree' used to write the software is available as part of the Technical Support Package for this article, although a program listing is not.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25898/TN.

0083 Water Panels for Passive Heating: Tankwall sections absorb solar energy with little reradiation to the outside

Department of Energy, Washington, DC.

Apr 84 *(C, D)*

A passive solar heating element known as Tankwall has been subjected to thermal tests and found to perform effectively. A Tankwall is a water-containing panel that forms the exterior walls of a house, collecting heat from sunlight and reradiating the heat to the interior of the house. A Tankwall fits between standard 2-by-6-in. studs, 24 in. on center. A carpenter can install a Tankwall panel in 15 minutes. A Tankwall system can be installed at less cost than comparable field-constructed passive systems. Each Tankwall panel contains horizontal baffles that prevent the thermal stratification of water normally associated with vertical containers. The thermal tests showed that the overall performance of a Tankwall is better than that of a flat-black waterwall with a night-insulation thermal coefficient of R4.5.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-005443, price code: A07.

Wood-Fueled Boiler Unit: Study evaluates the efficiency and emissions of a prototype central-heating unit

See 0377

CHEMISTRY

0084 Accelerated Curing of Epoxy Resins: Trisubstituted urea/epoxy mixture generates amine that lowers the curing temperature

Army Materiel Development and Readiness Command,
Alexandria, VA.
Oct 84 *(H, J)*

Dicyandiamide-(Dicy-) containing epoxy are cured at a relatively high temperature of 200C. In a study consisting of 20 experiments, which was conducted by the U.S. Army Materials and Mechanics Research Center, it was found that accelerators such as N-(4-chlorophenyl)-N, N-dimethylurea (monuron) can reduce the curing temperatures to less than 130C.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A129667/NAA, price code: A02, or contact project officer Robert E. Sacher (617) 923-3147.

0085 Accelerating Epoxy-Resin Curing: Trisubstituted ureas simplify the curing process and speed it up

Army Materiel Development and Readiness Command,
Alexandria, VA.
Jun 84 *(H, J)*

Research was conducted on the actions of accelerators such as monuron and diuron for curing epoxies. The materials -- N-(4-chlorophenyl)-N', N'-dimethylurea and N-(3,4-dichlorophenyl)-N', N'-dimethylurea, respectively -- significantly decrease the hardening temperature of epoxy resin-dicyandiamide mixtures. These trisubstituted-urea accelerators are believed to play a highly important role in the cure cycle.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A105870, price code: A02, or contact project officer Robert E. Sacher (617) 923-3147.

0086 Advanced System for Process Engineering

Department of Energy, Washington, DC.
Sep 84 *(A, C, D)*

ASPEN (Advanced System for Process Engineering) is a state-of-the-art process simulator and economic evaluation package which was designed for use in engineering fossil energy conversion processes. ASPEN can represent multiphase streams, including solids, and handle complex substances such as coal. The system can perform steady-state material and energy balances, determine equipment size and cost, and carry out preliminary economic evaluations. It is supported by a comprehensive physical property system for computation of major properties such as enthalpy, entropy, free energy, molar volume, equilibrium ratio, fugacity coefficient, viscosity, thermal conductivity, diffusion coefficient, and thermal conductivity for specified phase conditions - vapor, liquid, or solid. The properties may be computed for pure components, mixtures, or components in a mixture, as appropriate. The ASPEN Input Language is oriented towards process engineers.

FOR ADDITIONAL INFORMATION: Contact: NTIS Computer Products Center, National Technical Information Service, Springfield, VA 22161; (703) 487-4763. Refer to DE83-048979/TN.

Analysis of Polynuclear Aromatic Hydrocarbons in Particulate Matter by Luminescence Techniques
See 0381

0087 Analytical Methods for Synfuel Production: Techniques sometimes produce differing results from laboratory-to-laboratory

Department of Energy, Washington, DC.
Sep 84 *(C, D)*

As part of a program to develop standard methods, a roundrobin study among five laboratories has compared and contrasted procedures for distillation and solvent extraction used to quantify the distribution of fractions such as distillate, oils, asphaltenes, preasphaltenes, and residue. The procedures are used to characterize process streams in manufacture of synthetic fuel from coal. Because such streams are complex and thermally unstable, standardized analytical procedures are warranted.

FOR ADDITIONAL INFORMATION: Contact: Joseph F. Daly, SRC-1 Project Manager, U.S. Department of Energy, P.O. Box 2752, Allentown, PA 18001; (215) 481-1333.

Analytical Procedures for Aniline and Selected Derivatives in Wastewater and Sludge
See 0382

Aqueous Solution Standard Reference Materials Are Being Developed
See 0451

0088 Aromatic Polyimides With Group VI Linkages: Thermally-stable, solvent-resistant polyimides are readily processable by hot-melt techniques

National Aeronautics and Space Administration,
Washington, DC.
Feb 84 *(H, J)*

A new polymer system combines the thermal- and solvent-resistant properties of aromatic polyimides with the processability of PPX polymers. PPX polymers include the polyphenylene oxide, polyphenylene sulfide, and polyphenylene sulfone classes. They are generally more processable by the hot-melt or thermoplastic techniques than are the aromatic polyimides. However, the PPX systems are also more susceptible to attack by solvents and have lower glass-transition temperatures than does the PI group. A process for preparing an aromatic polyimide that can be fabricated by conventional hot-melt extrusion has resulted in polymer systems with imide ring structures and oxygen or sulfur linking groups. This synthetic modification results in a class of polymers with better thermoplastic and/or hot-melt flow properties than the base polyimide.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: N82-27493, price code: A02. For licensing information, contact, Howard J. Osborn, Langley Research Center, Mail Code: 279, Hampton, VA 23665, (804) 827-3725. Refer to: LAR-12980/TN.

Asbestos Fiber Determination In Water Samples: Preparation techniques, improved analytical method, and rapid screening
See 0384

Carbonate Fuel-Cell Cathode: Method for preparing porous cathode provides structural integrity and improved performance
See 0307

Catalog of Standard Reference Materials
See 0454

0089 Catalyst for Hydrogenation of CO: An improved catalyst reduces the costs of separating olefins from paraffins
Department of Energy, Washington, DC.
Sep 84 *(C, D)*

A catalyst proposed for the Fischer-Tropsch synthesis reaction increases the production ratio of C2 - C4 olefins to paraffins, reaching the order of about 45 to 1. This relatively high ratio reduces the cost of separating the two product groups and therefore the cost of synthetic fuel production. To date, the highest ratio obtained with other catalysts has been only 4 to 1. The proposed catalyst is based on a molecular sieve form of crystalline silica, called silicalite.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,340,503, which is available from: Commissioner of Patents, Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For further information contact: Dr. V.U.S. Rao, U.S. Department of Energy, Pittsburgh Energy Technology Center, P.O. Box 10940, Pittsburgh, PA 15236; (412) 675-6092.

0090 Catalysts for Lithium/Thionyl Chloride Cells: Organic compounds of iron or cobalt improve voltage and capacity of electrochemical cells
Army Materiel Development and Readiness Command, Alexandria, VA.
Jan 84 *(B, C, J)*

A quarterly report describes progress of a study of lithium/thionyl chloride electrochemical cells. The program is aimed at evaluating the polarization characteristics of polytetrafluoroethylene-bonded porous-carbon electrodes and improving cathode performance at high-discharge rates and low-operating temperatures. In particular, the program, which was carried out for the U.S. Army Electronics Research and Development Command, examined the use of electrocatalysis to improve cathode performance. Three phthalocyanine catalysts have produced marked improvements in both cell voltage and cathode capacity.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A114672, price code: A03.

Cathode Corrosion in Lithium/ulfuryl Chloride Batteries: Causes and cures of short shelf life are examined
See 0308

Characterization of Elastomer Vulcanizate Materials: Pyrolytic gas liquid-phase chromatography (PGC) identifies elastomers in sealing and connecting components of hydraulic system
See 0752

Characterization of Explosive Dusts: The hazards of several explosive dusts are established
See 0161

Characterizing Aluminum/Gallium Arsenide Semiconductors: Mechanisms of operation are elucidated
See 0959

Charged-Particle Flux Sensor: Improved design has greater collection efficiency
See 0456

0091 Chemical Feedstocks From Coal: Ethylene and other hydrocarbons are produced from an economically feasible process
Department of Energy, Washington, DC.
May 84 *(D, G)*

Substantial amounts of ethylene, benzene, and light oils are produced in a pyrolysis process in which methane is reacted with coal. Methane is not consumed in the reaction and can be recycled throughout the process. Economic advantage is gained by using coal as the only raw starting material, and by burning the char left over from the process to heat the methane to reaction temperatures. Previously, no process was available for producing economically significant amounts of chemical feedstocks from coal. The process involves reacting particulate coal with methane in a parallel-flow tubular reactor at 850C and 50 psig for approximately 2 seconds.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-002401, price code: A02. For licensing information, contact: Office of Assistant General Counsel for Patents, US DOE, Washington, DC 20585. For further information, contact Meyer Steinberg, Process Sciences Division, Department of Applied Science, Brookhaven National Laboratory, Upton, Long Island, NY 11973; (516) 282-3036.

Clinical Mass Spectrometers Are Now Available
See 0458

0092 Cold-Crucible Premelter for Silicon: A quartz crucible is refilled with molten silicon between crystal-growth cycles
National Aeronautics and Space Administration, Washington, DC.
Dec 84 *(G, H)*

The system allows the replenishment of the silicon melt in a crystal puller. The heart of the replenishment system is a cold crucible in which silicon chunks are heated and melted with a 500-kHz electromagnetic field. The cold crucible consists of a water-cooled, silver-plated boat surrounded by an induction coil. The coil induces a secondary current in the silver coating, heating it only slightly. The secondary current in turn couples with the preheated silicon chunks and causes them to melt. The concept could be applied to the crystal growth of other materials that are sufficiently conductive and difficult to keep free of contamination by the container walls at the temperature of operation.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-16050/TN.

Combined Retort and Combustor for Oil Shale: Continuous fluidized-bed process extracts both fuel and heat
See 0312

0093 Combined Silane Pyrolysis and Silicon-Particle Melt: Melter directly coupled to pyrolyzer would eliminate difficulties of transport
National Aeronautics and Space Administration, Washington, DC.
Oct 84 *(G, H)*

The fine silicon particles produced when silane is pyrolyzed are light, fluffy masses that have almost no ability to flow, making it difficult to transport them to a melter. A proposed coupling of a free-space silane pyrolyzer and a melter without intervening steps would produce molten silicon with no problems of fine-particle movement, storage, contamination in transport, or oxide formation.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15510/TN.

0094 Computer Program Available To Calculate Fluid Properties
Department of Commerce, Washington, DC.
Apr 84 *(A, J)*

An interactive FORTRAN IV program is available from the National Bureau of Standards to compute important thermophysical properties of argon, ethylene, parahydrogen, nitrogen, nitrogen trifluoride, and oxygen. The program calculates pressure, temperature, density, internal energy, enthalpy, entropy, specific heats (at constant volume or pressure), speed of sound, viscosity, thermal conductivity, and dielectric constant. Designed for engineers with access to mainframe computers, the program is available in hard copy or on magnetic tape.

FOR ADDITIONAL INFORMATION: Hard copy is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Order by stock number 003-003-02404-0. $4.75 prepaid. For magnetic tape, order NBS Standard Reference Data Base 6 from the Office of Standard Reference Data, A320 Physics Building, National Bureau of Standards, Washington, D.C. 20234, for $500.00.

Computer Program for Chemically Reactive Fluid Flow: Program solves the equations of transient multicomponent chemically reactive fluid dynamics
See 0960

0095 Cooling by Para-to-Ortho-Hydrogen Conversion: A catalyst speeds the conversion, increasing the capacity of a solid-hydrogen cooling system
National Aeronautics and Space Administration, Washington, DC.
Apr 84 *(J)*

The addition of a catalyst would increase the capacity of hydrogen-sublimation cooling systems for radiation detectors. The catalyst would speed the endothermic conversion of para-hydrogen to ortho-hydrogen at heat-absorption stations in the vent line. One possible configuration for a catalytic converter is that the porous catalyst is held between two cylindrical screens. At typical hydrogen-cooler flow rates (a few milligrams per second), the ortho/para-hydrogen distribution after conversion should closely approach the equilibrium distribution for the operating temperature of the converter.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: GSC-12770/TN. This technology is available for licensing.

Cracks in Glass Polymers Induced by Solvent Absorption: The combination of soluble particles and absorbed solvents cause polymer cracking
See 0763

Data On Natural And Synthetic Gas Mixtures is Compiled
See 0316

Descriptions For Reservoir Chemical Processes Are Developed
See 0144

Detecting Methane Leaks: A remote sensor uses laser radiation backscattered from natural targets
See 0462

Determining the Point of Zero Zeta Potential in Solid Samples: In a new technique, the sample does not have to be in powder form
See 0467

Development of a Continuous Monitor for Detection of Toxic Organic Compounds
See 0469

Development, Design, and Operation of a Cascade Impactor
See 0470

Dewatering Peat With Activated Carbon: A proposed process should produce enough gas and carbon to sustain itself
See 0319

0096 Diffusion Measurements in Microemulsions: Polarography yields the same value of diffusion coefficients as quasi-elastic light scattering (QLS)
Army Materiel Development and Readiness Command, Alexandria, VA.
Oct 84 *(J)*

In a study conducted for the U.S. Army Armament Research and Development Command, diffusion coefficient measurements in both aqueous micelles and microemulsions have been carried out using the techniques of polarography and quasi-elastic light scattering. In the polarographic method, the diffusion coefficient of an electroactive oil-soluble probe is determined at a polarizable microelectrode. In high water-content microemulsions, both methods yield the same diffusion coefficients, both of which can be identified as the self-diffusion coefficient.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number AD-A133801/NAA, price code: A02, or contact project officer Reginald P. Seiders (301) 671-2761.

Dual-Function Treatment for Nuclear Waste: Process prepares spent radioactive fuel for storage and extracts noble metals from it
See 0934

Dynamic Simulation of Chemical Processes: A variety of software packages are evaluated
See 0393

0097 Electrical Dissipation Measurement of Polymer Phase Transitions: The change in dipole packing occurring with each transition is sensed by its effect on the dissipation factor
National Aeronautics and Space Administration,
Washington, DC.
Mar 84 *(H, J, K)*

A simple technique measures the solid/solid, glass/rubber, and liquid/liquid transition temperatures in polymers having dipole moments. The technique is based on a change in dipole packing that occurs with each transition and is measured as a change in the electrical dissipation factor. The polymer sample, in the form of a thin film, is tested as the dielectric of a capacitor. The capacitor electrodes and their leads are fabricated from 0.02-mm aluminum foil. The electrical dissipation measurement technique has potential applications for such polymer systems as polysulfones, polyimides, epoxies, and polyethylene. Some possibilities are continuous quality control in the manufacture of thin films; moisture content monitoring of potting materials used in the manufacture of solid-state devices; the detection of environmental aging of polymeric structural components in automobiles, aircraft, and boats; and monitoring of the condition of polymeric storage containers for chemical waste.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: LAR-12861/TN.

0098 Enthalpy of Coal Fluids: Thermodynamic model aids in simulation of synthetic fuel processes
Department of Energy, Washington, DC.
Aug 84 *(C, J)*

A report describes a preliminary computer model for determining the enthalpy of coal fluids using a modified Lee-Kesler equation of state. The model was designed so that it can be applied to all fluid streams and process conditions encountered in coal conversion processes. The model can be applied to both petroleum and coal fluids. The accuracy of the model depends on the accuracy of the available parameters.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-004891/NAB, price code: A17. For information not in the report, contact: Joseph F. Daly, Jr, SRC-1 Project Manager, U.S. Department of Energy, P.O. Box 2752, Allentown, PA 18001; (215) 481-1333.

Estimating the Degree of Cross-Linking in Rubber: A new analysis of both the extension and retraction may give better estimates
See 0775

Estimating the Solubility of Gases in Battery Electrolytes: The estimates are in excellent agreement with experimental values
See 0326

Extracting Oil From Tar Sands: Oil can be extracted using solar energy
See 0328

Fluorine Mixer/Vaporizer for Chemical Lasers: The fluorine is vaporized by a flow of helium
See 0968

Freeze/Thaw Properties of Cellular Glass: Without moisture, temperature cycles do no harm
See 0783

0099 Gelled Anti-icing Agents: A gelling agent such as pectin is added to an antifreeze/water mixture
National Aeronautics and Space Administration,
Washington, DC.
Feb 84 *(D, H, J)*

Gelled anti-icing agents have been proposed to prevent ice formation on vertical or horizontal surfaces. The formulations include water with dimethyl sulfoxide (DMSO) as the deicer and pectin as the gel former. Previously recommended for use as an antifreeze in closed radiators, DMSO reacts with water to form solutions with freezing points as low as -69C. Mixtures of DMSO and pectin form soft, gelatinous materials that are easily spread onto surfaces. Gelled deicers are also much less volatile than plain deicers. A 0.25-inch DMSO gel layer lost 75 percent of its volume in a 106-day outdoor exposure, but remained functional. These anti-icing agents have wide market potential for ice prevention on runways, highways, bridges, and sidewalks.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and a diagram is available by ordering the monthly subscription package, order number PB84-925402, price code E02.

0100 Generating SiF4 From H2SiF6: Sodium and barium fluorosilicates are precipitated and then thermally decomposed into silicon tetrafluoride
National Aeronautics and Space Administration,
Washington, DC.
Sep 84 *(G, J)*

A new process generates silicon tetrafluoride (SiF4) gas from hexafluorosilicic acid (H2SiF6), a waste byproduct of the phosphate-fertilizer industry. The method of generating SiF4, a source of silicon for the manufacture of solar cells, involves the precipitation and decomposition of an insoluble salt of the acid. Aqueous solutions of sodium and barium salts (NaCl, NaF, NaOH, Na2CO3, BaCl2, and BaF2) added to a 23 percent aqueous solution of H2SiF6 quickly precipitate fluorosilicates, Na2SiF6 and BaSiF6.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15721/TN.

Glass Ceramics, Shape Memory, and Ferroelectric Materials: Report presents three results from materials studies
See 0784

0101 Growing Single-Crystal Sheets by Controlled Cooling: Immersed heating and cooling elements would establish the desired temperature gradients
National Aeronautics and Space Administration, Washington, DC.
Dec 84 *(G, H)*

The conventional Czochralski method of pulling a crystal from a melt of its own composition that is encapsulated by a layer of molten boric oxide may produce crystal defects because of extreme temperature gradients occurring during the growth cycle. A proposed method envisions the use of a high-pressure, Czochralski crystal-growth apparatus as is presently employed to grow gallium arsenide and gallium phosphide but modified to accept deep crucibles so that deep layers of encapsulant can be used, plus X-ray or an optical or sonic-imaging system to observe the growth of the crystal submerged in the encapsulant. The proposed method would be especially applicable to the horizontal growth of ribbons of compound semiconductors.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to Paul F. McCaul, NASA Resident Office-JPL, Mail Code: 180-601, 4800 Oak Grove Drive, Pasadena, CA 91103; (213) 354-2700. In either case refer to NPO-15800/TN.

0102 High-Yield Alcohol Fermentation Process: Vacuum fermentation combined with vacuum distillation reduces energy needs
Department of Energy, Washington, DC.
Dec 84 *(C, D)*

An improved fermentation process for producing ethanol combines vacuum fermentation and vacuum distillation. This combination can realize close to 50 percent in total energy savings over conventional continuous fermentation and distillation at atmospheric pressure. In addition, equipment size and, therefore, capital investment are reduced.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,359,533, which is available from: Commissioner of Patents, Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For further information, contact: Charles R. Wilke, Department of Chemical Engineering, Lawrence Berkeley Laboratory, 1 Cyclotron Road, Berkeley, CA 94720; (415) 486-5161.

Hydrogen Production From Heavy Fuels: Better heat-transfer properties may avoid sulfur poisoning of the catalyst
See 0341

0103 Improved Gas Seal for Electrolytic Cells: Breakage by differential thermal expansion is reduced
National Aeronautics and Space Administration, Washington, DC.
Dec 84 *(D)*

Cells for the hot electrolysis of gases (to produce oxygen, for example) are improved by a design that reduces the vulnerability of the gas seals to breakage at the operating temperature of about 1000C. In the new design, the electrolyte tube is lengthened so that the seal can be made outside the hot operating region. The inner and outer metal gas-flow tubes are both brazed to the metallized ceramic tube at the same axial position. To further restrain the differential thermal expansion of all three tubes, the outer tube is surrounded by a compression fitting at the joint.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15163/TN.

Improved Negative Electrodes for Secondary Cells: Additives significantly improve cell capacity and stability over multiple discharges
See 0342

Improved Nickel-Cell Electrode Material: An ozonation process gives higher capacity
See 0343

Improved O2/H2 Gas-Mixture Sensor: Monitor of mixture concentration uses a catalyzed and an uncatalyzed temperature probe
See 0496

0104 Improved Radiative Control of Ribbon Growth: Shield modifications enhance growth rate while reducing silicon oxide formation
National Aeronautics and Space Administration, Washington, DC.
Dec 84 *(G, H)*

Improvements in an apparatus for growing dendritic-web silicon crystals increase the growth rate and reduce the formation of silicon oxide. Both the crucible lid and the radiation shields were modified. In the growth apparatus, the significant heat-loss mechanism is thermal radiation. The radiation shields control the temperature distribution in the web and in the melt by modifying the radiation field where the web is crystallizing. The temperature distribution in turn determines both the growth speed and the thermal stresses in the crystal.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15916, 17, and 18.

Improved Thermosetting Imide Resins: The modified resins have a lower curing temperature
See 0788

0105 Improving Hydrocarbon Separation in Gas Chromatography: Modified silica spheres enhance chromatographic separation
National Aeronautics and Space Administration, Washington, DC.
Apr 84 *(J, K)*

Gas chromatographic separations of low-molecular-weight hydrocarbons are enhanced if modified silica spheres are used as the stationary phase. Commercially-available silica spheres are modified by reacting them with molecules containing isocyanate and isothiocyanate groups. Possible applications of the surface-derivatized spheres that result from the reaction include the analysis of samples produced by atmospheric or soil probes.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-

0100. Refer to ARC-11431/TN. This technology is available for licensing.

Instrument is Developed to Measure Lead in Human Tibia
See 0500

0106 Intermetallic Absorber for Hydrogen: A new compound offers a medium for separating hydrogen from other gases

Department of Energy, Washington, DC.
Dec 84 *(D, J)*

An intermetallic compound of zirconium and vanadium, stabilized by oxygen, can be used to absorb hydrogen from a mixture of gases and store it for later use. The compound has the formula Zr(x)VO(y(, where x ranges from 0.7 to 2 and y ranges from 0.18 to 0.33. The compound is prepared by melting together powders of the metals in a furnace under an inert atmosphere and adding oxygen in the form of a metal oxide. Hydrogen absorbed can be recovered by heating the intermetallic compound to a temperature of 500 C at a pressure of about 1/2 atmosphere. The hydrogen-absorbing capacity of the compound is about 100 torr-liters per gram at a collection pressure of about 2 atmospheres.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,358,429, which is available from: Commissioner of Patents, Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For additional information, contact: Dieter M. Gruen, Argonne National Laboratory, 9700 South Cass Avenue, Argonne, IL 60439; (312) 972-3513.

Ion Chromatography Monitors Environmental Waters: New technique provides rapid results with high accuracy
See 0405

Laser-Based Vacuum Ultraviolet Spectrometer
See 0504

Leak Tester for Cryogenic Flowlines: A gas chromatograph measures leakage into cavity surrounding the joint under test
See 0505

Linear Position-Sensitive X-Ray System
See 0508

Lockhopper Valves for Coal Gasifiers: Better valves are under development
See 0666

0107 Low-Pressure Alcohol Distillation: Heat requirements are lowered for the process

National Aeronautics and Space Administration, Washington, DC.
Oct 84 *(C, G)*

Vacuum distillation allows the use of low-temperature waste energy to produce alcohol for fuel. The temperature requirements are lowered enough to make solar heat absorbed by flat-plate collectors a feasible energy source. The alcohol is produced without adding other solvents, eliminating the need for dehydration or hydrocarbon stripping as a final step. Distillation at reduced pressure can be used for products other than alcohol.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning license for its commercial development should be addressed to Leon D. Wofford, Jr., George C. Marshall Space Flight Center, Mail Code: CC01, Marshall Space Flight Center, AL 35812; (205) 453-0020. In either case refer to MFS-25516/TN.

0108 Low-Temperature Growth of SiC Single Crystals: Reasonable growth rates are obtained at 1,330 to 1,500C

Department of Energy, Washington, DC.
Sep 84 *(G, H)*

A process has been developed for growing single crystals of cubic silicon carbide at relatively low temperatures for use in the manufacture of semiconductors. The process, which uses molten lithium as a solvent, grows single crystals at temperatures substantially lower than in previous processes, reducing the production cost and allowing the use of a greater variety of crucible materials. The single crystals of silicon carbide in the cubic or beta form are obtained by holding an excess of polycrystalline SiC in contact with both molten and vaporous lithium, causing the polycrystalline SiC to dissolve. The liquid solution that is being continuously enriched in SiC is then maintained for a sufficient time to obtain crystals of the desired size.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,349,407, which is available from: Commissioner of Patents, Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For further information, contact: Lynn B. Lundberg, MS-J576, Los Alamos National Laboratory, P.O. Box 1663, Los Alamos, NM 87545; (595) 667-5150.

Low-Temperature Reactions for Waste Disposal: Toxic wastes can be made with low energy expenditure and small capital investment
See 0408

0109 Low-Temperature Water Diffusion in SiO2 Thin Films: Nuclear-resonance profiling looks into the formation mechanism of IC thin films

Army Materiel Development and Readiness Command, Alexandria, VA.
Jun 84 *(B, J)*

A study conducted by the U.S. Army Electronics Research and Development Command investigated the consequences of water/SiO2 reaction on thin insulating films on the surfaces of semiconductors. The investigation was focused on a low-temperature, high-pressure thermal oxidation, a process considered for modern IC's that will operate at higher speeds and have smaller, more closely packed structures than the present IC's. The results of the 0-18 tracer diffusion measurements have demonstrated that water diffusion in SiO2 films proceeds by the transport of molecular water. The study suggests additional observations of permeation kinetics to obtain a complete picture of water diffusion in SiO2 films. The results would be of great benefit in the manufacture of future high-reliability IC's.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A116028, price code: A05 or contact project officer Robert L. Pfeffer (201) 544-2882.

Measuring Accurately With Thermocouples: Guidance is provided for detecting errors
See 0514

Measuring Additive Concentrations in Lubricating Oils: Nuclear magnetic resonance provides qualitative and quantitative information on key additives
See 0799

0110 Measuring Epoxy-Curing Kinetics: Key reaction parameters are estimated from a single run
National Aeronautics and Space Administration, Washington, DC.
Jul 84 *(H, J)*

Differential scanning calorimetry (DSC) forms the basis of two experimental methods for determining reaction parameters of an epoxy curing by a condensation reaction. The techniques determine the heat of reaction, order of reaction, and activation energy. In the first experimental method, the heat of reaction, activation energy, and order of reaction are estimated from a single DSC curve. In the second method, the activation energy is determined from a family of DSC curves taken at different rates of temperature rise during cure.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15710/TN.

0111 Measuring Trace Hydrocarbons in Silanes: The technique is rapid and uses standard analytical equipment
National Aeronautics and Space Administration, Washington, DC.
Nov 84 *(J, K)*

A chromatographic method includes a standard flame-ionization detector (FID) to measure low-level concentrations of hydrocarbons in silane. The presence of such hydrocarbons as methane, ethane, and ethylene causes carbon deposits in high-purity silicon resulting from silane pyrolysis. Silane gas containing traces of hydrocarbons is injected into a carrier gas of moist nitrogen having about 0.2 percent water vapor. The carrier, water, and silane pass through a short column packed with powdered sodium hydroxide, which combines with the moisture and silane to form a nonvolatile sodium silicate. The carrier gas, free of the silane, but containing the nonreactive hydrocarbons, pass to a silica-gel column where a chromatographic separation takes place. The individual hydrocarbons are then measured by the FID.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15273/TN.

0112 Membrane Separation Overview Published
Department of Commerce, Washington, DC.
Mar 84 *(D)*

A National Bureau of Standards review of the state of technology in membrane separation processes points out that these techniques are the most thermodynamically efficient processes possible for separating chemical components. Compared to distillation, absorption, and stripping, which involve phase changes and cost up to 70% of the capital and 80% of the energy used in typical reaction processes, membranes offer substantial opportunities for savings. The review describes solid polymer (ultrafiltration and reverse osmosis) and hollow-fiber polymeric membranes and immobilized liquid and emulsion liquid membranes. It outlines some of the more important current and potential applications of these various separators.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB83-165068, price code: A03.

Microbial Enhancement of Oil Recovery: Bacteria aid in oil production and utilization
See 0921

Microscopy Opens New Frontier at Berkeley: Two electron microscopes reach unprecedented performance heights, one revealing atoms directly
See 0529

Microwave Spectrometer Developed
See 0057

Mixed Conduction in Semi-Insulating Gallium Arsenide: A new analytic technique allows more accurate calculations
See 0530

Modified Antifreeze Liquids for Use on Surfaces: Viscosity agents and antifreeze liquids are evaluated
See 0803

0113 Moisture-Transmitting Polymers: The vapor transmissivity and physical properties of hydrophilic polyurethane films qualify them for a variety of applications
Army Materiel Development and Readiness Command, Alexandria, VA.
Jan 84 *(H, J)*

A document describes a study of hydrophilic polyurethanes. Hydrophilic polymers are attractive materials for fabric coatings with high-moisture vapor transmission for use in reverse osmosis, biomedical applications, separation processes, and the like. The study was carried out by the U.S. Army Materials and Mechanics Research Center. Hydrophilic polyurethanes are particularly suitable for such applications because they form tough, flexible films when they are dry. Depending on composition, a wide range of water-vapor transmission rates can be obtained with hydrophilic polyurethanes, accompanied by varying degrees of swelling and full retention of physical properties. The study described in the report elucidates the nature of interactions between water and this class of polymers.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A118967, price code: A07, or contact project officer Joyce L. Illinger (801) 923-5980.

Molten Slag Would Boost Coal Conversion: A proposed reactor would increase the residence time of unconverted char
See 0676

0114 Monitoring Lignin Content in Paper Processing: Feedstock and finished pulp can be analyzed and controlled automatically
National Aeronautics and Space Administration, Washington, DC.
Aug 84 *(D, G)*

A proposed microprocessor-based system would control the digestor in paper processing automatically and in real time. The system acquires samples from the feed hopper, the digestor, and the blow tank. The sample is homogenized, washed, and dried while it is conveyed to a flash pyrolyzer. In the pyrolyzer, the material is converted into its basic constituents--mostly compounds of molecular weight less than 200. The microprocessor calculates the lignin content, and feeds this information to the control system for adjustment of such parameters as pressure, temperature, and white-liquor flow.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15796/TN.

Multifunctional Sensor Electrode
See 0532

National Tritium Labeling Facility
See 0870

National Voluntary Laboratory Accreditation Program
See 0534

0115 Negative Ion Chemical Ionization Mass Spectroscopy (NICIMS) Successfully Detects Trace Compounds
Department of Commerce, Washington, DC.
Jul 84 *(J, K)*

Using negative ion chemical ionization mass spectrometry, NBS researchers have successfully measured certain trace organic compounds that are difficult to detect when using the more common technique of electron impact mass spectrometry (EIMS). Bureau researchers over the last year have used NICIMS to measure polynuclear aromatic hydrocarbons (PAH) -- compounds found in petroleum, coal and alternate fuels that are products of incomplete combustion processes such as automotive exhaust, Two of these compounds, the potentially carcinogenic benzo(a)pyrene (BaP) and its noncarcinogenic isomer benzo(e)pyrene (BeP), produced nearly identical mass spectra when measured by EIMS, making it difficult to distinguish between the two. But using NICIMS, bureau researchers have achieved high measurement sensitivity and have been able to selectively detect BaP in complex samples.

FOR ADDITIONAL INFORMATION: Contact: Mr. Laurence Hilpert, Room A113, Chemistry Building, National Bureau of Standards, Washington, D.C. 20234; (301) 921-2153.

0116 Neutron Scattering Is Used To Study Structures In Epoxies
Department of Commerce, Washington, DC.
Dec 84 *(G, H, J, K)*

National Bureau of Standards scientists are looking at the microscopic structures in cured epoxy resins with a small angle neutron scattering (SANS) technique. SANS, a nondestructive tool that uses low-energy neutrons to characterize three-dimensional properties in materials, permits researchers for the first time to study the uniformity of crosslinking networks that grow out of polymer chains. Crosslink density distribution is a major factor in determining the structural properties of cured polymers. This information will help scientists predict product performance and assist manufacturers to control curing processes. Uses include graphite fiber composites for high performance aerospace components and sports equipment as well as fiber glasses for molded items, housewares and automobile bodies.

FOR ADDITIONAL INFORMATION: Contact: Drs. Donald L. Hunston, Wen-Li Wu, or Barry J. Bauer, A209 Polymers Building, National Bureau of Standards, Gaithersburg, MD 20899; (301) 921-3318.

0117 New Catalytic Reactions Cut Energy Requirements: Reactions that ordinarily consume a large amount of energy proceed at much lower temperatures
Department of Energy, Washington, DC.
Jan 84 *(D, J)*

A variety of new catalytic reactions allows a synthesis of ammonia and hydrocarbon fuels at temperatures much lower than are otherwise possible. The reactions therefore result in substantial energy savings. In the ammonia-synthesis reaction, nitrogen and hydrogen are combined in the presence of rhenium. Over the temperature range of 603 to 713 K, rhenium displays an initial catalytic activity that is nearly an order of magnitude higher than that of iron--the principal component of industrial ammonia synthesis.

FOR ADDITIONAL INFORMATION: Contact: Professor G. A. Somarjai, University of California, Department of Chemistry, Berkeley, CA 94720; (415) 642-4053.

0118 A New Class of Chemical Labels Has Been Developed
Department of Health and Human Services, Washington, DC.
Apr 84 *(E, J)*

A new class of chemical labels that could benefit many analytical tests has been developed by researchers at Northeastern University in Boston, Massachusetts. These labels called release tags have the potential of exceeding the sensitivity of even the most sensitive radiolabels such as Iodine (125). This high level of sensitivity makes them suitable for use in the very sensitive assays required to detect biological substances active at minute concentrations, for example hormones, carcinogen-DNA adducts, and certain infectious disease agents. If successfully developed and automated, release tags will reduce the need for expensive and hazardous radioisotopes, while increasing the sensitivity of biochemical assays.

FOR ADDITIONAL INFORMATION: Contact: Mr. Ed Post, National Institutes of Health, Research Resources Information Center, 1776 East Jefferson Street, Rockville, MD 20852; (301) 881-4150.

New Directory Of Accredited Laboratories
See 0536

New Insights Into Recirculating Bed Reactors: Coal mixer modeling and coal hydrodesulfurization are examined
See 0417

0119 New Liquid Compound Separation Technique Developed
National Aeronautics and Space Administration, Washington, DC.
Nov 84 *(J, K)*

A technique for the separation of chemical compounds for biological samples was developed at the NASA Jet Propulsion Laboratory. This technology has been used in medical, pharmaceutical and forensic chemistry applications. The process involves a single step procedure which reduces time, cost and equipment requirements typical of other liquid separation techniques. The separation technology uses a disposal tube partially filled with a material which is granular, inert and water-absorbent. A biological liquid sample (blood, urine, spinal fluid, etc.) is poured into the extraction tube where water and other impurities are absorbed by the filling material. The remainder of the sample is distributed in a very thin film over the large surface area provided by the granular filler material in the tube. Extraction of a particular compound is accomplished by flushing the tube with an appropriate specific solvent. The solvent containing the dissolved compound is collected for further processing and analysis. Additional compounds may be separated from the sample in the tube by using different specific solvents. This technology has been used successfully for the rapid detection of controlled substances by drug abuse program personnel.

FOR ADDITIONAL INFORMATION: Contact: TECTRA fact sheets, School of Business and Public Administration, California State University, Sacramento, CA 95819; (916) 454-6640. Refer to Case-W09-15/TN.

New Portable Instrument Measures CO in Blood
See 0060

0120 Nitrogen Supply Uses Hydrazine: Liquid hydrazine is dissociated and residual gas removed to produce almost pure nitrogen

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(J)*

A nitrogen generation module catalytically dissociates liquid hydrazine and then dissociates and separates the product gases to yield almost pure nitrogen. Designed for cabin nitrogen replenishment during space flight, the module performs three functions: hydrazine dissociation, ammonia dissociation, and hydrogen removal.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: ARC-11464/TN.

Nonliquid Process Prepares Plastics for Electroplating: Gaseous-phase preparation is much simpler than conventional liquid-phase preparation
See 0806

Oily Sludges: A Physical Characterization
See 0421

0121 Optimization of Liquid-Liquid Extraction Methods for Analysis of Organics in Water

Environmental Protection Agency, Washington, DC.
Sep 84 *(J)*

A study was conducted of a liquid-liquid extraction (LLE) procedure for the analysis of volatile organic compounds (VOC's) in water. The method consists of a single step extraction with n-pentane in a closed vial, followed by gas chromatographic (GC) analysis of the compounds in the extract. Several aspects of the procedure have been investigated, including extraction efficiencies, precision, accuracy, and speed. While not without deficiencies, LLE is a speedy and convenient procedure for the analysis of VOC's in water. The method has been shown to be capable of precise and accurate measurements for the compounds used in the study.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB84-112937/NAC, price: $14.50, or contact Thomas A. Bellar, Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, Cincinnati, OH 45268.

0122 Oscillating-Crucible Technique for Silicon Growth: Technique would yield better mixing of impurities and superior-quality crystals

National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(G, H)*

Crystalline silicon obtained by unidirectional-solidification would be significantly improved by accelerated rotation of the growth crucible and seed. In the proposed technique, the accelerated motion stirs the melt, which reduces temperature gradients and decreases the boundary layer for the diffusion of impurities near the growing surface. The results would be better mixing of impurities into the melt, a decrease in the tendency for dendritic growth or cellular growth, and crystals with low dislocation density. Accelerated/decelerated crucible rotation has been applied with success to solution growth and Czochralski growth, resulting in large crystals of superior quality..

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15938/TN.

Packaging Nuclear and Chemical Waste for Disposal: Waste would be encapsulated in hollow silicon spheres
See 0422

0123 Perfluoroalkylene-Ether Triazine Elastomers: New process yields a product that resists heat and the action of oxygen and water

National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(H, J)*

The end-product physical properties are carefully controlled in a new synthesis procedure for perfluoroalkylene-ether triazine elastomers. The elastomers are highly resistant to heat, oxidation, and hydrolysis. The starting material is perfluoroalkylene-ether dinitrile, which is reacted rapidly with ammonia to form the corresponding diamidine. All reactions are stepwise -- that is, reactant is added to the mixture only after previously added reactant has been consumed. Emphasis on a step-wise process to achieve reproducibility is underscored by the uniform thermal and physical properties of the final cross-linked polymers. Indeed, efforts to develop a batch, rather than stepwise, process produced highly erratic results and were abandoned.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for the commercial use of this invention should be addressed to Darrell G. Brekke, Ames Research Center, Mail Code: 200-11A, Moffett Field, CA 94035, (415) 965-5104. In either case refer to ARC-11402/TN.

0124 Petroleum Crude Oil Reference Material Available

Department of Commerce, Washington, DC.
Sep 84 *(C, J)*

The National Bureau of Standards researchers have developed a standard reference material (SRM) for evaluating analytical methods used to measure trace organic constituents in petroleum oil samples. Known as SRM 1582, Petroleum Crude Oil, the new material will allow laboratories to check their measurements and determine how well they are performing the steps -- sample preparation and handling, for example -- required to analyze complex oil samples. The material is certified to contain specified concentrations of six compounds on the Environmental Protection Agency's list of 'priority pollutants' -- benz(a)anthracene, benzo(a)pyrene, dibenzothiophene, flouranthene, perylene, and phenathrene. The SRM also is useful in evaluating analysis methods for similar compounds in alternate fuels such as coal-derived liquids. It complements an earlier-developed shale oil SRM and consists of five vials, each containing 2 milliliters of petroleum crude oil sample.

FOR ADDITIONAL INFORMATION: The SRM is available for $178 from the Office of Standards Reference Materials, B311 Chemistry Building, National Bureau of Standards, Washington, D.C. 20234; (301) 921-2045.

0125 Photoacoustic Spectroscopy of Chemical Reactions: Technique yields information on polymerization and electrochemical reactions

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 84 *(J)*

A report discusses applications of gas-microphone photoacoustic spectroscopy to chemically active systems. Fourier-transform infrared photoacoustic spectroscopy was used to study surface reactions on zeolites and photopolymerization reactions in acrylates. The chemical reactions were initiated in the photoacoustic cell and followed in the cell. The catalytic studies, which were performed for the U.S. Army Research Office, were carried out in a cell capable of withstanding temperatures of 400C; the cell allowed gas to flow through it during data acquisition.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A134663/NAA, price code: A02, or contact project officer George Wyman (919) 549-0641.

Poisoning of Semiconductors
See 0544

0126 Polycarbosilazane-Resin Polymerization Process: Process is suitable for production of silicon nitride/ silicon carbide fibers

National Aeronautics and Space Administration, Washington, DC.

Dec 84 *(Polycarbosilazane, H, J)*

The polymerization of polycarbosilazane resin from the monomer tris (N-methylamino) methylsilane has been demonstrated at laboratory scale. High-tensile-strength silicon carbide/silicon nitride fibers are prepared by pyrolyzing fibers drawn from a melt of polycarbosilazane resin. Such fibers show promise as replacements for carbon fibers in high-strength composites for automotive, aerospace, and other applications where the high electrical conductivity of the carbon fibers makes them unsuitable. The resistivity of SixNyCz fibers prepared from polycarbosilazane is which is 100,000 times greater than that of carbon fibers.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for the commercial use of this invention should be addressed to Leon D. Wofford, Jr., George C. Marshall Space Flight Center, Mail Code: CC01, Marshall Space Flight Center, AL 35812; (205) 453-0020. In either case refer to MFS-25758/TN.

0127 Preparing Pure Silicon Monohydride: RF-sputtering process produces substantially pure amorphous silicon monohydride

Department of Energy, Washington, DC.

Sep 84 *(G, H)*

A reactive RF-sputtering process has been developed for controlling the monohydride and dihydride bond densities in amorphous silicon hydrides. The process can produce substantially pure silicon monohydride, which has superior semiconductor properties. Previously, the glow-discharge method and other reactive sputtering processes have been unable to produce films with exclusive monohydride bonds nor films with controlled monohydride/dihydride bonding ratio..

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,353,788, which is available from: Commissioner of Patents, Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For further information, contact Dr. Howard R. Shanks, Ames Laboratory, A-207 Physics Bldg., Iowa State University, Ames, IA 50011; (515) 294-6816/6018.

0128 Pressure Reducer for Coal Gasifiers: Multistage device resists the action of hard particles entrained in gas

National Aeronautics and Space Administration, Washington, DC.

Feb 84 *(D)*

A quasi-porous-plug pressure reducer has been designed for gases containing abrasive particles. The new device reduces the pressure of such gases with a lower rate of erosion than in conventional letdown valves. The device was developed for coal-gasification plants. The particles in the gas are almost as hard as diamonds, and they severely erode the hard stems and seats of conventional pressure-letdown valves. The key to the new pressure reducer is that it never lets the speed of the gas flowing through it approach the sonic and supersonic regions in which erosion is severe. The new device reduces the pressure in several stages. Each stage contains a cone-shaped partition with holes large enough to allow free passage of the entrained particles. The flow velocity through each hole can be controlled by choosing the total number of partitions in the reducer.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15100/TN.

0129 Pressure-Reduction Technique for Crystal Growth: Large crystals could be grown by varying the pressure rather than the temperature

National Aeronautics and Space Administration, Washington, DC.

Oct 84 *(J)*

A new method for growing crystals from hydrothermal solutions may permit the rapid growth of large, regular crystals with little or no undesirable convection. In contrast with earlier techniques, the new method would promote crystal growth from a solution by varying the pressure rather than the temperature. The proposed method is based on the fact that, in the near-critical and super-critical regions of most solutions, the solubility of the solute increases significantly with pressure. Therefore, the supersaturation of a solution can be increased by lowering the pressure, thus promoting crystal growth at constant temperature. In addition to being a potentially practical method of growing large crystals, the new technique can also be used to study crystal growth kinetics by a 'pressure wave' analog of conventional 'thermal wave' experiments. Here also, the new technique would have the advantages of faster response and freedom from convective interference.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15772/TN.

Process for Removing Heavy Metal from Water is Developed
See 0423

0130 Processor Generates and Extracts Silicon: An impinging jet/funnel system separates the silicon and salt formed in the reduction of silicon tetrachloride by sodium
National Aeronautics and Space Administration,
Washington, DC.
Mar 84 *(H, J)*

A processor now under development would continuously generate pure silicon and separate it from reaction byproducts. In a laboratory prototype, the reduction of silicon tetrachloride by sodium is the key reaction and the byproduct is NaCl, although other silicon halides could probably be substituted for the tetrachloride. In the processor, vapors or fine liquid sprays of sodium and silicon tetrachloride react to form gaseous NaCl and liquid droplets of silicon.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15582/TN.

Quantitative Analysis of Fire-Resistant Fuel: Spectrophotometry monitors proportions of fuel, emulsifier, and water
See 0361

Rechargeable Secondary Lithium Battery: Flat-plate 10- and 20-Ah batteries are demonstrated
See 0362

Removal and Recovery of Silver From Photographic and Photoreproduction Effluents
See 0427

Removing Biostatic Agents From Fermentation Solutions: Liquid carbon dioxide is an inexpensive solvent
See 0883

Removing PCB's From Oils: Contaminated oil can be cleansed and recycled, and the PCB's disposed of in the prescribed manner
See 0428

0131 Resonance Ionization Mass Spectrometry
Department of Energy, Washington, DC.
Jul 84 *(J, K)*

Resonance ionization mass spectrometry (RIMS) utilizes the elemental ionization selectivity of resonance ionization spectroscopy (RIS) to generate ions for analysis by a mass spectrometer. Since only the atoms of a particular element are ionized, isobaric (same mass, different element) interference normally associated with mass spectrometry is eliminated. The RIMS process can also be used to obtain atomic spectral information from a very small sample (less than 10 microgram). The technique makes use of a tunable dye laser with standard mass analyzers. RIMS can be applied equally well to magnetic, quadrapole, or time-of-flight mass analyzers. Some of the pulsed lasers of short-time duration are ideally suited to the latter analyzers. RIMS is useful in the elimination of isobaric interference in lanthanide or actinide analysis.

FOR ADDITIONAL INFORMATION: Contact: Office of Technology Applications, Information Service, Oak Ridge National Laboratory, P.O. Box Y, Oak Ridge, TN 37831; (615) 574-4192. Refer to 472/X/TN.

Resonance Ionization Mass Spectrometry
See 0557

Rewaterproofing Silica Tiles: A waterproofing agent is deposited deep into pores
See 0820

Scanning XeCl Laser: Potential applications of the narrow-bandwidth laser include remote sensing and high-resolution spectroscopy
See 0986

Selection Factors for Plastics: General guidelines and specific examples are presented
See 0824

Self-Cleaning Tubular-Membrane Module: Cleaning proceeds continuously, without hindering processing
See 0825

Simplified Laser Tuning: Tuning arrangement employs a single grating and two planar mirrors
See 0989

Simulating Transportation and Storage in Coal Refining: Computer model analyzes hypothetical situations and highlights problems
See 0431

0132 Sodium Spray Would Speed Silicon Production: The production rate of solar-grade silicon in a sodium/silicon tetrafluoride reactor would be increased by a spray feed
National Aeronautics and Space Administration,
Washington, DC.
Jan 84 *(G, H)*

Liquid sodium would be sprayed into a sodium/silicon tetrafluoride reactor according to a new proposal for increasing the production rate of solar-grade silicon. The large surface-to-volume ratio of the sprayed sodium droplets would make the reaction proceed faster than if the liquid sodium was poured into the reactor. In the proposal, the liquid sodium at about 100 C is sprayed into the silicon tetrafluoride gas and reacts with it only at the bottom of the reactor, where the temperature is 400 to 900 C. The rest of the reactor temperature is low enough to avoid excessively vaporizing the sodium, so that the reaction products form only on the reactor bottom. This method could be applied to similar processes where electropositive metals reduce halides. Halides that can be reduced this way include $TiCl_4$, ZrF_4, and HfF_4; and the metals used include sodium, magnesium, and zirconium.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15246/TN.

Solvent-Resistant Polysulfones: Polysulfones terminated with trimethylsilylethynyl, ethynyl, and phenylethynyl groups have increased solvent resistance
See 0831

0133 Standards For Toxic Metals In Human Urine Are Developed
Department of Commerce, Washington, DC.
Dec 84 *(E, J)*

The National Bureau of Standards (NBS) has developed a standard reference material (SRM) that should help analytical laboratories make accurate determinations of toxic metal levels in human urine. The SRM was developed to improve measurements made when monitoring human exposure to a variety of toxic substances. Urine tests have been shown to be good indicators of exposure to toxic elements such as arsenic, mercury, and lead. For indications of long-term exposure to toxins, medical professionals normally rely on blood tests, but for an accurate gauge of short-term exposure, urine analysis usually is the method of choice. The procedure of gathering data on toxic exposure through urine tests is no easy task, and it has been compounded by a lack of reliable standards. The urine reference material is powdered, freeze-dried form and should be reconstituted before use by adding pure water. Four bottles are included in the SRM: two each at low and elevated toxin levels.

FOR ADDITIONAL INFORMATION: To order any of the human urine reference materials contact the Office of Standard Reference Materials, B311 Chemistry Building, National Bureau of Standards, Gaithersburg, MD 20899; (301) 921-2045 and ask for further details.

0134 Starting Silicon-Ribbon Growth Automatically: A programable two-channel controller reproduces standardized growth conditions

National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(G, H)*

A semiautomatic system developed by a NASA contractor starts the growth of silicon sheets more reliably than systems with purely manual control. The system uses a commercial programable process controller to ensure that the pulling speed and temperature are varied reproducibly during the crucial initial stage of growth. Once growth has been established and is proceeding normally, the controller relinquishes control of the growth furnace and can then be used to initiate growth in another furnace.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15919/TN.

0135 Stirred Reactor Dynamics: Effects of the vortex induced by a stirrer are examined

Department of Energy, Washington, DC.
Sep 84 *(J)*

A report describes a cold-flow, as opposed to 840F, hydrodynamic study of a stirred reactor used in the laboratory-scale production of clean solid and liquid fuel from high-sulfur coal. The study consisted primarily of measurements of gas holdup. The report suggests that formation of a vortex during stirring causes a relatively large holdup in the reactor.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-004891/NAB, price code: A17. For information not in the report contact: Joseph F. Daly, SRC-I Project Manager, U.S. Department of Energy, P.O. Box 2752, Allentown, PA 18001; (215) 481-1333.

Stronger Carbon Fibers for Reinforced Plastics: New process makes fibers 70 percent stronger at lower carbonization temperatures
See 0835

Submarine Air Monitoring System Improved
See 0564

Suitcase-Sized Portable Microbiology and Clinical Laboratories Developed
See 0566

0136 Supercritical Fluid Extraction Method is Developed

Department of Commerce, Washington, DC.
Sep 84 *(J)*

The use of dense gases in a supercritical state as solvents in chemical extractions and separations has grown rapidly in the last 10 years as an alternative to liquid solvents and distillation methods. Supercritical fluid extraction (SFE) offers improved thermal efficiency in some cases, avoids thermal degradation of extracted components in other systems, and substitutes non-toxic solvents for toxic ones in certain food and drug processes. SFE also has applications as an analytical tool and for thermophysical properties measurements. A new report, A Review of Supercritical Fluid Extraction summarizes the physical phenomena and describes several applications of SFE in the energy and chemical industries (coal conversion, de-ashing, de-caffeination) and in analysis and measurements.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB84-161892/NAC, price code: A05.

0137 Supercritical-Multiple-Solvent Extraction From Coal: Large and small molecules dissolve different constituents

National Aeronautics and Space Administration,
Washington, DC.
Jul 84 *(C, D, G)*

Multicomponent fluids at or near supercritical temperatures and pressures may be more effective in extracting hydrogen-rich material from coal than are single compounds. According to experiments, mixtures of solvents enable supercritical extraction at temperatures below 400C: This is desirable because some coal components rapidly polymerize above 400C. Supercritical extraction is based on the increased solubility of certain solids in compressed fluids. The extraction yield proved to be strongly dependent on temperature, roughly doubling from 320 to 380C.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15767/TN.

Ternary Compound Electrodes for Molten-Salt Cells: Corrosion is reduced, and fabrication is simplified
See 0371

Thermal Modeling of Bridgman Crystal Growth: Heat flow is modeled for a moving or stationary rod-shaped sample inside a directional-solidification furnace
See 0994

Three-Zone Catalyst Resists Sulfur Poisoning: Zone configuration and composition increase efficiency
See 0437

Totally Optical Technique for Monitoring Ambient Non-Methane Hydrocarbons
See 0576

0138 Two-Temperature-Zone Silicon Reactor: Temperature profile confines SiF4 reduction by sodium to the reactor bottom

National Aeronautics and Space Administration,
Washington, DC.
Jan 84 *(G, H)*

When high purity silicon is synthesized by the reduction of silicon tetrafluoride by sodium, a very-fast highly exothermic reaction takes place. A controlled reaction has been proposed in which a SiF4-pressurized vertical reactor operates with two temperature zones. Liquid sodium feeds from a nozzle at the top of the reactor without reacting with the SiF4. When the sodium reaches the higher temperature region at the bottom, the reaction takes place immediately.
FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15368.

0139 Ultrasonic Blending of Epoxy Curing Agents: Method is fast, safe, and proven effective

Army Materiel Development and Readiness Command,
Alexandria, VA.
Sep 84 *(G, H)*

A major obstacle in the preparation of new resins for advanced composites in the mixing of polymer/curing-agent combinations. Some of these promising combinations are not readily mixable by conventional methods because of the high melting temperatures of the curing agents. Lowering the curing temperatures by the addition of solvents is hazardous and is no guarantee of good results. The answer may be ultrasonic mixing, a technique studied for the U.S. Army Aviation Research and Development Command. To demonstrate the technique, four different diamine curing agents were ultrasonically blended with an epoxy resin. Results indicated that there were no significant differences in composition or flexural strength averages.
FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A129974/NAA, price code: A02.

0140 Vibrating Electrode System Improves Trace Element Detection

Department of Commerce, Washington, DC.
Dec 84 *(J, K)*

At the National Bureau of Standards a novel flow-injection system has been developed that can measure electroactive species, including toxic metals such as lead, mercury and chromium, at levels as low as parts per trillion. The system has shown a 10- to 20-fold increase in sensitivity over flow-injection systems using stationary electrodes. The heart of the system is a tiny electrode made of a material such as gold or palladium that is vibrated at a controlled frequency by a loudspeaker. The electrode is placed in a miniature electrochemical cell through which a stream of electrolyte passes. The electrode is maintained at a constant voltage, and the current passing through the vibrating electrode is monitored. The sample to be analyzed is then injected into the flowing stream of electrolyte. A corresponding current peak is observed at the electrode which is directly proportional to the concentration of a given element in the sample. The sensitivity of the vibrating electrode is virtually independent of the electrolyte flow rate, whereas sensitivities of stationary electrode systems depend on the flow rate.
FOR ADDITIONAL INFORMATION: Contact: Dr. Kenneth Pratt, National Bureau of Standards, Chemistry Building, Room A225, Gaithersburg, MD 20899; (301) 921-2883.

Viewer Makes Radioactivity Visible: A battery-operated viewer could aid in contamination surveys and medical diagnoses
See 0585

0141 WATEQF - A FORTRAN IV Version of WATEQ, a Computer Program for Calculating Chemical Equilibria of Natural Waters (1984 Version)

Geological Survey, Reston, VA.
Dec 84 *(A, J)*

WATEQF is a FORTRAN IV computer program that models the thermodynamic speciation of inorganic ions and complex species in solution for a given water analysis. The original version (WATEQ) was written in 1973 by A. H. Truesdell and B. F. Jones in Programming Language/one(PL/1). With but a few exceptions, the thermochemical data, speciation, activity coefficients, and general calculation procedure of WATEQF is identical to the PL/1 version. A report notes the differences between WATEQF and WATEQ, demonstrates how to set up the input data to executive WATEQF, provides a test case for comparison, and makes available a listing of WATEQF. The program is written in the FORTRAN 77 programming language for implementation on a PRIME 750 computer using the PRIMOS VERSION 19.2.5 operating system. 110K bytes of core storage are required to operate the system.
FOR ADDITIONAL INFORMATION: NTIS Computer Products Center, National Technical Information Service, Springfield, VA 22161; (703) 487-4763. Refer to PB84-199314/TN.

CIVIL ENGINEERING

0142 Bituminous Equipment for Road Paving: Present and future areas of development are presented

Army Materiel Development and Readiness Command,
Alexandria, VA.
Jan 84 *(D)*

A review is available on the concepts, equipment, and practices of road-paving operations along with the possible improvements for achieving more efficient operations in the future. The work was prepared by the U.S. Army Mobility Equipment Research and Development Command. The first section of the review deals with materials handling and processing. Included are discussions on such commonly used raw-aggregate materials as crushed stone, gravel, sand, and other fillers and the asphaltic materials used for cement. The section on paving operations covers a wide variety of finishing machines, compaction equipment, and surface-treatment equipment.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A116254, price code: A03 or contact project officer Andrew C. Tinsman (703) 664-2576.

Compatibility of Grouts with Hazardous Wastes
See 0389

Computer Aided Structural Engineering Project Develops
See 0070

Control of Decay in Above-Water Marine Pilings
See 0940

Cost Estimating Methods for Water Supply Planning Are Developed
See 0900

0143 Curved Caps Raise Corrugation Strength: Construction concept would increase the strength-to-weight ratio of corrugated panels

National Aeronautics and Space Administration,
Washington, DC.
Mar 84 *(D)*

Flat caps are replaced by curved caps in a new concept for constructing corrugated panels. The curvature would significantly increase the buckling strength over that of previous panels. Also changed is the beaded web of the conventional panel, which was previously reduced to a single thickness at the point of attachment to the cap. In the new design, the web is moved under the cap strip edge to spread the attachment over more of the cap. The wider joint restrains the cap, enabling it to carry its design load without edge rotation or premature buckling.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to Howard J. Osborn, Langley Research Center, Mail Code: 279, Hampton, VA 23665; (804) 827-3725. In either case refer to LAR-12884/TN.

0144 Descriptions For Reservoir Chemical Processes Are Developed

Department of the Army, Washington, DC.
Apr 84 *(D, E, J)*

A conceptual model of aerobic and anaerobic chemical processes in reservoirs was formulated for producing a computer subroutine that depicts the development of anoxic conditions in reservoirs. Aerobic and anaerobic chemical reaction rate coefficients suitable for use in a subroutine developed for a water quality model (CE-QUAL-R1) were obtained for many reservoir ecosystems. These data have been tested in field studies. Guidance to selection of appropriate coefficients for reservoirs that have not been studied is provided.

FOR ADDITIONAL INFORMATION: Contact: Rex L. Chen, U.S. Army Engineer Waterways Experiment Station, P.O. Box 631, Vicksburg, MS 39180; (601) 634-3621.

Determining Tensile Strength of Rocks: Simple, inexpensive method provides tensile strength of rock
See 0903

EPA Macroscopic Planning Model (EPAMAC) for Stormwater and Combined Sewer Overflow Control: Application Guide and User's Manual
See 0399

Epoxy Grout With Silica Thickener: Grout cures quickly, even in the presence of hydraulic oil
See 0773

Evaluation of Forklift Trucks: Four different types of forklift trucks are evaluated for productivity and economy
See 1011

Floating Breakwater Research Is Developed
See 0942

0145 Flood Damage Database Updating Uses LANDSAT

Department of the Army, Washington, DC.
Apr 84 *(D)*

A capability was developed to delineate flooded areas as a function of river stage and land use classes, and develop timely and economical procedures for establishing and updating floodplain land use with Landsat 4 data and historical flood databases with archived Landsat data. The system is being used for water management and control during flood fight exercises and flood control project planning studies. The procedure is now referred to as the Flood Analysis Simulation Technology (FAST) System. The system offers a much more reliable, rapid, and economical method of evaluating alternative flood control projects. It is immediately applicable to flood control studies by private engineering firms doing such work for state and local governments.

FOR ADDITIONAL INFORMATION: Contact: Jack K. Stroll, USAE Waterways Experiment Station, P.O. Box 631, Vicksburg, Mississippi 39180; (601) 634-2620.

0146 Frictional Hold of Various Sheave Configurations Studied

Department of the Navy, Washington, DC.
Nov 84 *(D, F, H)*

The Naval Civil Engineering Laboratory has completed a study on the frictional hold of various sheave configurations on synthetic ropes. During the study, thirty eight test series were conducted using eleven different sheave configurations, two sizes of polyester rope, and one size of nylon rope. Tests were conducted with a taut line wrapped around a rotating sheave in both wet and dry conditions. Friction coefficients were measured continuously from static to slipping condition. The test variables included line tension, sheave diameter, line diameter, groove geometry, groove surface roughness, groove coating material, and speed of sheave rotation. The coefficient of friction was found to decrease with decreasing groove surface roughness, decreasing sheave diameter, increasing enclosed angle of the groove and increasing line tension. The study yielded numerical information that allows the traction winch designer to calculate, with a degree of confidence, the back tension required for traction winch designs that use varying sheave shapes, sheave diameters, and sheave quantities.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A139808/NAC, price code: A08.

0147 A Guidance Has Been Developed To Evaluate Existing Water Distribution Systems

Department of the Army, Washington, DC.
Mar 84 *(D)*

Guidance has been prepared on testing water distribution systems, evaluating pipe breaks, deciding when to clean and line water mains, and using water distribution models. These techniques have been tested and documented in field studies and are useful for engineers working with water distribution systems.

FOR ADDITIONAL INFORMATION: Contact: Thomas M. Walski, WESEE-R, U.S. Army Engineer Waterways Experiment Station, P.O. Box 631, Vicksburg, MS 39180; (601) 634-3931.

0148 LANDSAT Emergency Access and Products (LEAP)

Department of Commerce, Washington, DC.
Oct 84 *(D)*

The National Oceanic and Atmospheric Administration (NOAA) has initiated a new service called the Landsat Emergency Access and Products or LEAP. LEAP is a cooperative program with the Federal Emergency Management Agency (FEMA). LEAP is designed to provide land remote sensing satellite or 'Landsat' data quickly to state and local government agencies of the United States where these data can be used in times of natural and man-made disasters to aid in protecting lives and property and in conducting post-disaster recovery activities. NOAA's Landsat data products routinely take two to six weeks to reach customers. With LEAP, however, many Federal, state, and local government agencies can obtain Landsat data the same day that the satellite acquires an image of a disaster site.

FOR ADDITIONAL INFORMATION: For further information, please contact the Office of Research and Technology Applications, FB4, Room 3316, Suitland, MD 20233; (301) 763-2418.

0149 Low Cost Bridge Deck Surface Treatment

Federal Highway Administration, Washington, DC.
Dec 84 *(D)*

The surfaces of bridge decks have had problems of maintenance and durability. Almost all of the bridge decks in the United States are concrete slabs, many of which have been overlaid with asphaltic wearing surfaces in order to protect the top of the structural slab. However, the porous nature of this asphaltic surface allows water and deicing salts to penetrate to the top of the concrete slab where they stay for long periods of time. The combination of moisture and deicing salts together with freeze-thaw cycles attacks the concrete and causes corrosion-induced deterioration which may eventually make the bridge deck structurally inadequate to carry the load. Low cost sealers were investigated to determine materials which would reduce water and salt penetration into concrete bridge decks to be overlain with asphaltic concrete. Such materials are needed because the asphalt overlay often acts as a sponge, trapping water and salt on the portland cement concrete deck surface. A literature search and numerous letters to manufacturers resulted in 110 products for consideration. Three materials met the criteria chosen.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB84-238740/NAC, price code: A04.

Low Temperature Concrete Mortar Properties Are Detailed
See 0509

0150 Magnesium Polyphosphate Cement Concrete: Concrete repair material for use under wet conditions and temperature extremes

Department of Energy, Washington, DC.
Feb 84 *(D, H)*

A process that produces a quick setting magnesium polyphosphate cement concrete has been developed. The novel aspects of this development are the extreme tolerance to moisture which permits placement during rain and the use of undried aggregate, and rapid curing under temperature conditions that preclude the use of other materials. The material has been laboratory proven and is now undergoing field tests for possible use by the United States Air Force. The materials can be used for major concrete repair that has to be made under adverse moisture or temperature conditions; such as, highways, bridges, mine supports, dams, pipes and industrial flooring. A patent application is pending. The process is available for exclusive or non-exclusive licensing.

FOR ADDITIONAL INFORMATION: Contact: W. Marcuse, Office of Research and Technology Assessment, Brookhaven National Laboratory, Upton, Long Island, New York 11973; (516) 282-2103.

Magnetic Wire-Rope Tester: Rope interiors can be inspected nondestructively
See 0511

Measuring Temperature Profiles of Earth's Surface: Thermal properties of earth are measured in situ
See 0524

0151 New Superplasticizers Are Being Used In Concrete

Department of the Army, Washington, DC.
Mar 84 *(D, H)*

High-range water-reducing admixtures, known also as superplasticizers, have found extensive use elsewhere. One can either take advantage of the tremendous increase in strength or maintain the same strength and obtain a fourfold increase in workability (slump). Initial work has indicated problems with achieving the proper air-void system in superplasticized concrete for effective frost resistance. This technology is useful to all elements engaged in concrete construction. Both public and private sectors would benefit from the information developed in this study.

FOR ADDITIONAL INFORMATION: Contact: Kenneth I. Saucier, U.S. Army Engineer Waterways Experiment Station, P.O. Box 631, Vicksburg, MS 39180; (601) 634-3251.

Nonlinear Stress Concrete Structures Program
See 0078

Predicting Rubble Motion in Blasts: Computer model makes it possible not only to blast rock but also to move the broken rubble in a predictable manner
See 0925

0152 Preventing Moisture Damage to Bituminous Materials: Damage inhibitor is abundant in shale oil

Department of Energy, Washington, DC.

Apr 84 *(H)*

A desired property of bituminous binder materials is resistance to damage from moisture and repeated freeze/thaw cycles. Bituminous binders are widely used with mineral aggregates to construct roads and pavements, to serve as roofing materials and pond liners, and to function in other applications where moisture resistance is needed. Moisture-damage-inhibiting agents are often added to bituminous binders to improve resistance to moisture damage. Recently, a molecular type containing the pyridine moiety was found to be an effective agent. In one laboratory test, samples of a bituminous composition containing pyridine-pretreated aggregate were unaffected by 20 freeze/thaw cycles, compared to the control samples which failed after seven cycles. Even smooth uncrushed stones, such as those recovered from a riverbed, which ordinarily do not bond satisfactorily to a bituminous binder, bond well when a pyridine moiety is present.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,325,738, which is available from: Commissioner of Patents Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

0153 Quick-Setting Polymer Concrete: High strengths are obtained using a water-soluble binder

Department of Energy, Washington, DC.

Sep 84 *(H)*

Polymer concretes using a water-soluble binder, furfural alcohol (FA), facilitate the rapid repair of deteriorated airport runways, bridges, and highways. Unlike the conventional polymer concretes that use water-insoluble organic binders and require dry aggregate for the production of high-strength concrete, the new composition is compatible with wet or frozen aggregate. The FA has low flammability and can cure at temperatures ranging from -20 to 40C in as little as 1 hour. The concretes have compressive strengths of 2,000 psi after 1-hour curing when 8.5 percent water is present in the mixture and even higher strengths when less water is present.

FOR ADDITIONAL INFORMATION: For further information, contact: Dr. William Marcuse, Brookhaven National Laboratory, Building 130, Upton, NY 11973; (516) 282-2103. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

Rewaterproofing Silica Tiles: A waterproofing agent is deposited deep into pores

See 0820

0154 Robotic Control System for Excavation Equipment: Full automation offers great flexibility

Army Materiel Development and Readiness Command, Alexandria, VA.

Oct 84 *(F, G)*

A microprocessor-based robotic control system can operate heavy excavation equipment such as a backhoe in areas hazardous to human operators. The system, which is under development by the U.S. Army Mobility Equipment Research and Development Command, utilizes an 8-bit microprocessor to drive a third-order system consisting of electrohydraulic valves, optical encoders, and inertial loads. The computer programs are written in PASCAL and stored in online floppy disks.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A134728/NAA, price code: A04, or contact project officer Reinaldo J. Chavez, (703) 664-5876.

Self-Modulated Laser Rangefinder: Longitudinal resonance modes are exploited

See 0560

0155 Simplified Modeling of Tetrahedral Trusses: Models reduce the time and cost of structural analyses

National Aeronautics and Space Administration, Washington, DC.

Feb 84 *(D)*

Two models reduce the complexity of calculations of the static and dynamic behavior of tetrahedral-truss structures. The models are used for structures with repeating tetrahedral units. Examples include large antennas to be deployed in space, long plate or box configurations, or radio towers. In one model, a structure with many lattice units (bays) is replaced by an analogous structure with a smaller number of bays. The second transformation parameter, T, is the ratio of the length of a diagonal element in the model to the length of the corresponding element in the structure. The transformation equations relate the stiffness coefficients (extension, bending, transverse-shear, and torsional) of the continuum beam model to the structural geometry, structural dimensions, and structural-material stiffness properties.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: LAR-12815/TN.

Simplified Procedures Have Been Developed for Calculating Chemical Doses for Water Stabilization

See 0430

0156 Spill Alert Device for Earth Dam Failure Warning

Environmental Protection Agency, Washington, DC.

Aug 84 *(D, K)*

The problem of failures of earthen dams and dikes, retaining walls, lagoon embankments, etc., is ageless and has continued to be a source of catastrophic losses. A major goal of the current project was the 'translation' or conversion of nonaudible acoustic emission (AE) from soil structures to some measurable or recordable format that could be used as a nondestructive test of the safety of such containment structures. An AE spill alert device has been developed and subjected to extensive laboratory and field testing. A wide range of other potential uses and applications exists for AE monitoring.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB84-138189/NAC, price: $14.50. Other information is available from John E. Brugger, Oil and Hazardous Materials Spills Branch, Municipal Environmental Research Laboratory--Cincinnati, U.S. Environmental Protection Agency, Edison, NJ 08837.

0157 Spray Machine For Applying A Polymer Resin Overlay To Road Surfaces

Department of Energy, Washington, DC.

Feb 84 *(D, F)*

A self contained and self powered spray machine which mounts on the back of a truck and uniformly blends and

dispenses a fast setting polymer resin overlay onto road surfaces from an overhanging spray manifold. The machine contains equipment for internal purging with air and flushing with solvent to prevent freeze up from contained resin residue. The machine is controlled by one man using one hand at a central, 3 button, control station. The most notable feature of the prototype unit is the 3 button pneumatic control system. The buttons control spraying, flushing, and purging respectively. They are interlocked so that regardless of the sequence or combination in which they are actuated, the machine will not be damaged and the supply systems will not be cross contaminated. In addition, the compressed air storage tank provides the power with which the operator can flush and purge the machine following an electric power, resin pump, or air compressor failure. This minimizes the threat of catastrophic freeze up when things go wrong.
FOR ADDITIONAL INFORMATION: Contact: William Marcuse, Office of Research and Technology Application, Brookhaven National Laboratory, Upton, Long Island, N.Y. 11973; (516) 282-2103. A U.S. patent has been applied for.

0158 Steel Grating Cage Provides Secure Enclosure

Department of the Navy, Washington, DC.
Apr 84 *(D)*

Certain standard commercial steel grating panels, 2 by 10 feet, can provide significant resistance to hand and power tool forced entry attacks when properly assembled into a security cage. The special riveting, welding, and structural forming required to make these gratings safe, strong, and rigid as walkways also makes them tough to cut, bend, or tear apart when a person tries to gain entry through them. In forced entry tests several standard grating panels were attacked with implements ranging from hand tools such as hacksaws, wedges, bolt cutters and sledge hammers, to special tools such as jaws-of-life, power abrasive saws, oxy-acetylene cutting torch, and oxygen burn bars. The panels were able to withstand attacks for a time equal to that of the approved high security padlocks and hasps that would be used to secure the door. The cages are bolted together for easy assembly and disassembly.
FOR ADDITIONAL INFORMATION: Contact: Naval Civil Engineering Laboratory, Mr. Bob Leek, Code L61, Port Hueneme, CA 93043; (805) 982-5927.

Tester for Friction Rock Supports
See 0572

Tritium Radioluminescent Lighting Developed for Remote Sites
See 1021

COMBUSTION, ENGINES, & PROPELLANTS

0159 Acoustic Emissions Reveal Combustion Conditions: Turbulent-flame acoustic emissions change with air/fuel ratio variations

National Aeronautics and Space Administration, Washington, DC.
Sep 84 *(J)*

The acoustic emissions from turbulent gas flames may be useful both for the diagnosis of combustion processes and for fuel/air control. An experimental study has identified a turbulent-flame acoustic spectrum and characteristic audiofrequencies at which the amplitudes are sensitive to air/fuel ratios. It already appears that acoustic emissions might be sensed and processed to detect inefficient operation; and a control system would respond by adjusting the fuel/air mixture for greater efficiency.
FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15699/TN.

0160 Calculating the Flow Field in a Radial Turbine Scroll: Finite-difference and finite-element methods give glow solutions

National Aeronautics and Space Administration, Washington, DC.
Mar 84 *(A, D)*

In many applications, radial turbines offer benefits over axial turbines. With advantages such as high efficiency over a range of speeds, less sensitivity to tip clearance, simplicity, and ruggedness, radial gas turbines are being used or considered for helicopter engines, automotive engines, small power systems, and a number of other applications. A set of two computer programs calculates the flow field in a radial tubine scroll. These new programs represent an improvement in analyzing flow in radial turbine scrolls and provide the designer with tools for designing better scrolls. These programs are written in FORTRAN IV for batch execution.
FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to LEW-13437/TN.

0161 Characterization of Explosive Dusts: The hazards of several explosive dusts are established

Army Materiel Development and Readiness Command, Alexandria, VA.
Jul 84 *(D, J)*

A study examined ways to determine the relative explosive hazards of dusts. The work, performed for the U.S. Army Armament Research and Development Command, is applicable to manufacturing plants with dust-collection systems for combustible materials in which the potential of explosion exists. Explosibility is determined by measuring minimum ignition temperature, ignition energy, explosion concentration, explosion pressure, and maximum rate of pressure rise. The mechanism of dust ignition and explosion in dusts was identified as the accumulation of static electricity resulting from the collision between dust particles and with the duct walls.
FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A123793/NAA, price code: A09, or contact project officer W. O. Seals (201) 724-2852.

0162 Depositing Sialon Coating on Turbine Rotors: Sialon layer is formed on a refractory substrate via chemical-vapor deposition

Department of Energy, Washington, DC.
May 84 *(G, H)*

A layer of sialon ($Si3Al3O3N5$) is reaction-deposited to a silicon nitride substrate by a chemical-vapor-deposition process. The resulting composite material is intended for use as the rotor in an external combustion/turbine system. The silicon nitride can withstand the high temperature and pressure in such turbines, while the sialon coating protects the component against oxidation and fouling. By directly expanding combustion gases, topping-cycle turbines can increase the efficiency of electric power-plants from 34 to 40 percent to 50 to 60 percent.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,336,304, which is available from: Commissioner of Patents, Washington, DC 20231. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. DOE, Washington, DC 20585.

Drilling Precise Orifices and Slots: A combination of mechanical drilling and EDM is used
See 0621

0163 Flow Through a Rotating Turbomachinery Blade Row: Full potential, transonic quasi-three-dimensional flow is calculated

National Aeronautics and Space Administration,
Washington, DC.
Feb 84 *(A, D, F)*

A computer program, QSONIC, has been developed for calculating the full potential transonic quasi-three-dimensional flow through a rotating turbomachinery blade row. As blade speeds increase, the numerical problems inherent in the transonic regime have to be resolved. QSONIC provides the flow analyst with a fast and reliable means of obtaining the transonic potential flow distribution on a blade-to-blade stream surface of a stationary or rotating turbomachine blade row. QSONIC combines several promising transonic analysis techniques. The QSONIC is written in FORTRAN IV for batch execution.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to LEW-13832/TN.

Guidelines for Placement of Product-of-Combustion Fire Sensors in Underground Mines
See 0491

0164 Hot Isostatic Pressing (HIP) Technique Can Improve Certain Alloys Used in Aircraft Engine Turbine Blades

Department of the Navy, Washington, DC.
Aug 84 *(G, H)*

A team of researchers from the Naval Research Laboratory report that a new hot isostatic pressing (HIP) technique will improve alloys used in aircraft engine blades. Once this technique is field-tested and applied in the processing of turbine blades for the engines of jet aircraft such as the Navy's F-14s and A7s, it could possibly double the life of the blades. Gas turbine blades are made from high strength nickel-base alloys called superalloys, which are cast to their final shape from a molten alloy. The casting process invariably leaves internal shrinkage pores which weaken the blades and ultimately contribute to the premature failure of the blades. The team explored the HIP technique as a means to close shrinkage pores created during the casting of the turbine blades with the intent of eliminating porosity in the blades and thus significantly increasing their service life.

FOR ADDITIONAL INFORMATION: Contact: Mr. Richard Fulper, Jr., Naval Research Laboratory, Code 1405, Washington, DC (202) 767-3744.

How Synfuels Behave in Gas Turbines: Combustion products can be different from those of petroleum-based fuels
See 0338

Integrally Cast Rotors for Turbines: The cost of machining separate rotor blades can be avoided
See 0659

0165 Jet Engines as High-Capacity Vacuum Pumps: A large diffuser operational envelope and long run times are possible

National Aeronautics and Space Administration,
Washington, DC.
Sep 84 *(F)*

Two gas-turbine jet engines would provide the primary ejection stream in a high-capacity eductor vacuum pump. Originally proposed to create a low-pressure environment for testing rocket engines, the system could find applications in such industrial processes as handling corrosive fumes, the evaporation of milk and fruit juices, petroleum distillation, and the dehydration of blood plasma and penicillin. In contrast to an equivalent steam-driven system, the jet-engine-driven system for testing rocket engines would cost half as much to build and one-fourth as much to operate, would require less space, and would operate for longer times.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning license for its commercial development may be addressed to Leon D. Wofford, George C. Marshall Space Flight Center, Mail Code: CC01, Marshall Space Flight Center, AL 35812; (205) 453-0020. In either case, refer to MFS-25791/TN.

A Multifuel, Low-Emission Gas Turbine: Variable-area air injector improves efficiency at all power levels
See 0416

0166 Off-Design Turbine Modeling: Off-design efficiency and flow function are obtained from design-point input data

National Aeronautics and Space Administration,
Washington, DC.
Jun 84 *(A, D, F)*

A turbine modeling technique rapidly obtains off-design performance from design-point input. This technique is applicable to large axial-flow turbines that may or may not incorporate variable geometry in the first-stage stator. A user-specified option permits the calculation of design-point cooling-flow levels and the corresponding change in turbine efficiency. Computer program PART is an improved method of representing the turbine component when performing calculations of off-design performance for advanced air-breathing engines. PART is written in FORTRAN IV and is accessible from an IBM 360/67 time-sharing system terminal.

FOR ADDITIONAL INFORMATION: Contact: Computer software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to LEW-13674/TN.

0167 Oil Burner With Nearly Stoichiometric Combustion: A method of vaporizing and mixing the fuel increases the thermal efficiency to 84 percent

Department of Energy, Washington, DC.
Sep 84 *(C, D)*

A two-stage combustion burner uses a heated surface to vaporize the No. 2 fuel oil before combustion. The process of vaporizing and mixing the fuel with preheated air reduces the amount of excess air this burner needs for soot-free operation. The amount of excess air is only 3 percent as opposed to the 45 percent mechanical-spray-diffusion burners need to meet the same soot-free standard. The reduced air requirement produces a nearly-stoichiometric carburated stream, which results in a thermal efficiency of 84 percent or about 10 percent improvement in annual fuel savings over the mechanical-spray-diffusion burner in a standard residence in the Northeastern United States.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-016419/NAB, price code: A03. For information not in the report, contact James D. Hickerson, Pittsburgh Energy Technology Center, P.O. Box 10940, Pittsburgh, PA 15236; (412) 675-5721.

0168 Oxidation-Resistant Columbium Nozzles: Investment casting and silicide coating are combined to yield strong heat-tolerant parts for gas turbines

Army Materiel Development and Readiness Command,
Alexandria, VA.
Mar 84 *(H)*

A report discusses a program for development of investment-cast gas-turbine nozzles composed of a columbium alloy. Single-vane segments in C129Y alloy (Nb/10Hf/10W/0.3Y), coated with a silicide (50 W/20 Mo/15 Ti/10V) were produced. The goal of the program was to utilize the state-of-the-art in columbium casting and coating technologies to fabricate the nozzles. The C129Y alloy was selected because of its superior weldability, castability, lower melting temperature, and strength. Despite many difficulties in foundry procedure, the castings displayed exceptional properties at elevated temperature.

0169 PANEL Code for Planar Cascades: Plane cascade flow is solved using improved surface-singularity methods

National Aeronautics and Space Administration,
Washington, DC.
Aug 84 *(A, D)*

Current external aerodynamic integral-equation techniques may be adapted for use in internal flow calculations. The inherent computational speed and flexibility of integral-equation solutions can make them very useful for design calculations. The present cascade method is a versatile design tool that will allow a designer to explore many preliminary blade designs in a short period of time.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to LEW-13862/TN.

0170 Predicting Life of Ceramic Components in Gas Turbines: Experimental and analytical results are compared

Army Materiel Development and Readiness Command,
Alexandria, VA.
Sep 84 *(H, K)*

A study has been made of ways to predict the life expectancy of silicon nitride in gas-turbine disks. Previous experimenters conducted their tests on small parts with very small volumes compared with the volume of typical gas-turbine components. There was a need for generating a time-to-failure data base on a component, the size of a typical gas-turbine component with temperature and stress distributions similar to those in gas-turbine components. This data base could then be used as a test case for evaluation of models of failure and computer programs used to predict time to failure. In the study, made for the U.S. Army Materials and Mechanics Research Center, a rotating disk was designed to fail by time-dependent mechanisms. Three different data bases (double torsion, stress rate, and stress rupture) were used to calculate reliability versus time, and the results were compared with the experimental results. The best correlation with the experimental results was given by the stress rupture data base.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A134783/NAA, price code: A03, or contact project officer Lynn M. Baker (617) 923-3466.

0171 Proposed Short-Throat Supersonic Nozzles: Enlarged, fractional-radius-ratio transonic-nozzle throats promise negligible performance losses

National Aeronautics and Space Administration,
Washington, DC.
Feb 84 *(D)*

Progress in the numerical analysis of supersonic flow fields has yielded promising results for nozzles having radius ratios less than 1.0. Evaluation of numerical solutions down to radius ratios of 0.5 indicates a negligible performance loss in the nozzle throat, provided that the throat area is enlarged to compensate for the decrease in discharge coefficient caused by the sonic-line warpage. The numerical procedure analyzes mach numbers along the wall and in the flow field, wall pressures, gas temperatures, and nozzle-throat discharge coefficients.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB84-925402, price code E02.

0172 Reducing Aircraft-Engine Noise: Shock structure is modified to eliminate the associated noise

National Aeronautics and Space Administration,
Washington, DC.
Apr 84 *(D)*

An imperfectly-expanded supersonic jet flow contains a periodic or regular shock cell structure, which generates high levels of shock-associated noise. This shock structure can be modified to eliminate the radiated noise by adding a layer of slightly supersonic airflow adjacent to the noisy jet. A drastic change in the shock structure takes place when this added layer increases in velocity from subsonic to supersonic. This abrupt change in the shock cell system arises principally because a subsonic flow cannot transmit flow discontinuities such as shocks, but a supersonic flow can. The effectiveness of this concept has been demonstrated for coaxial jets representative of turbofan engines.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: LAR-12890/TN.

Reducing Soot in Diesel Exhaust: Electrically charged fuel improves oxidation

See 0426

0173 Retrofitting Diesels to Burn Alcohol: The problems and future potential of using ethanol as a fuel in diesel engines are discussed
Department of Energy, Washington, DC.
Aug 84 *(C, D)*

An assessment has been made of the methods for retrofitting diesels for ethanol utilization as an alternative fuel. In the event of a serious shortage of diesel fuel, the alternative fuels become important, particularly to the farming community, which depends heavily on diesel equipment. A promising method involves the introduction of ethanol into the air-intake stream of the engine. Results of a study using a four-cylinder, turbocharged diesel engine showed that prevaporization is the best method of introducing ethanol since the problems of compressor wear and cylinder-to-cylinder distribution are eliminated.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-021022/NAB, price code: A03. For information not provided in the report, contact Ralph D. Fleming, U.S. Department of Energy, CE-1312, Washington, DC 20585; (202) 252-8055.

Rhenium Prevents Corrosion: Thrust chamber is protected from corrosive fuel during burns
See 0821

SiC-AlN Ceramics: New ceramic material for diesel engine application is characterized
See 0827

Solutions of Transonic Flow in Turbomachines: Accurate approximations are obtained using perturbation techniques
See 0717

0174 Staging Two-Phase Turbines: Turbine efficiency is 70 percent with staging as compared to 63 percent without staging
National Aeronautics and Space Administration, Washington, DC.
Oct 84 *(D, F)*

A staging method solves the problem of friction loss and low efficiency of two-phase (liquid/gas) flow in turbines by using high blade-tip speeds in the first stage and progressively lower tip speeds in succeeding stages. The relative velocity between the liquid and the turbine blades and the accompanying friction drag are thereby reduced. Even if all of the relative velocity between the liquid and the turbine blades is dissipated in friction, the new staging method would still keep the turbine efficiency high.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning license for its commercial development should be addressed to Paul F. McCaul, NASA Resident Office-JPL, Mail Code: 180-601, 4800 Oak Grove Drive, Pasadena, CA 91103; (213) 354-2700. In either case refer to NPO-15037/TN.

0175 Turbin Blades Improved
Department of the Navy, Washington, DC.
Jul 84 *(G, H)*

A team of researchers at the Naval Research Laboratory (NRL), working in conjunction with the Naval Air Systems Command (NAVAIR), has demonstrated that a hot isostatic pressing (HIP) technique can improve certain alloys used in aircraft engine turbine blades. The team reports that the technique, once field tested and applied in the processing of turbine blades for the engines of jet aircraft could possibly double the life of the blades. The team explored the HIP technique as a means to close shrinkage pores created during the casting of the turbine blades with the intent of eliminating porosity in the blades.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, Virginia 22448. Refer to 090304/TN.

Two-Slit Optical Particle-Measuring System: Sizes and velocities are quickly estimated
See 0578

COMMUNICATIONS

0176 Advanced Technology UHF Receiver Study: Effect on UHF television allotments
Department of Commerce, Washington, DC.
Nov 84 *(B)*

A new study provides estimates of how many additional UHF channels could be made available if channel assignment limitations having to do with the receiver intermediate frequency (I.F.) were eliminated. An advanced technology receiver with characteristics that would make feasible the elimination of these restrictions has been constructed. The estimates provided here of additional channel availability are obtained by examining the detailed situation in every area of the country with the aid of a recently developed computer program. The computer program provides expanded tables of UHF-TV channel allotments as samples of the possibilities. These tables are hypothetical, generated only for the purpose of this study.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB84-173848,NAC, price code: A06.

Bidirectional Fiber-Optic Cable Adapter: Two different wavelengths of light are transmitted in opposite directions on a single optical fiber
See 0956

0177 BURST - A Computer Program of a Meteor Burst Communications Model Used to Predict the Reliability of a Communications System That Uses Meteor Bursts as the Communications Channel
Department of Commerce, Washington, DC.
Oct 84 *(A, B)*

The meteor burst communications model is a user-interactive computer model that predicts the reliability of a communications system that uses meteor bursts as the communications channel. The model predicts the waiting times required to complete the transfer of messages from a master station to a remote station as a function of frequency, transmitter and receiver characteristics, system protocol, distance separation, time of year, and time of day. The model also allows the user to specify a network of stations including the master, remote, and relay stations. Waiting time estimates are computed for the entire network. The model is implemented on a minicomputer operated by the Institute for Telecommunication Sciences. The program is written in the FORTRAN programming language for implementation on a HP 1000-F computer using the RTE-4B or RTE-6 operating system.

FOR ADDITIONAL INFORMATION: Contact: NTIS Computer Products Center, National Technical Information Service, Springfield, VA 22161; (703) 487-4763. Refer to PB84-180132.

0178 Coding for Single-Line Transmission: Scheme for code generation and conversion has only modest equipment requirements

National Aeronautics and Space Administration,
Washington, DC.
Mar 84 *(B)*

A new digital transmission code combines data and clock signals into a single waveform. Previously, Manchester-coded biphase waveforms were used in a NASA application. Manchester generators were needed for encoding, and bit synchronizers were needed for decoding. In contrast, MADCODE needs only four standard integrated circuits in both the generator and the converter plus five small discrete components. In MADCODE, the beginning of each bit period is characterized by a low-to-high transition; since such a transition occurs only at the beginning of a bit period, the clock information is recovered from the code readily.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: KSC-11220/TN.

Connecting Separate Computers to a Common Bus: A network bus adapter handles protocols for computer-to-computer communications
See 0197

0179 Effect of Face Masks on Electronic Speech-Recognizers: A face mask may actually improve recognition accuracy

Army Materiel Development and Readiness Command,
Alexandria, VA.
Jul 84 *(B, E)*

A study evaluated the effect of face masks on the accuracy of electronic recognition of speech. Two types of masks were evaluated--one with a microphone inside, the other with a microphone outside. The mask with the internal microphone provided better results with the speech-recognition system. The 92 percent recognition accuracy obtained with this mask is encouraging. However, further work is required to determine the degree of accuracy acceptable for specific applications. Tests, which were conducted by the U.S. Army Human Engineering Laboratory.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A129371/NAA, price code: A02.

Effect of Temperature on Fiber-Optic Delay: Fiber/jacket interactions affect performance
See 0963

Efficient Distribution of Frequency-Standard Signals: Path-length-corrected system can use microwaves or optical links with minimal hardware
See 0476

0180 Evaluation of the Comprehension of Non-Continuous, Sped-Up Vocoded Speech: A strategy for coping with fading HF (high frequency) channels

Department of the Air Force, Washington, DC.
Nov 84 *(B)*

A novel technique for coping with facing and burst noise on high frequency channels used for digital voice communication has been developed and evaluated. The technique transmits digital voice only during the high signal-to-noise ratio time intervals, i.e., channel on times, and speeds up the speech when necessary in order to avoid delays which would hinder conversation. The technique was evaluated using a model of the human speech comprehension process, which was tested using a spoken version of a reading comprehension test. The test involved fifteen spoken, two-minute paragraphs processed by a real-time channel vocoder simulation which has been modified to also simulate the on/off characterisitics of a fading high frequency channel. Using a speed-up factor of 1.5, the percentage of correct test responses verified the comprehension model.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A138650/NAC, price code: A04.

0181 Fiber-Optic Instrumentation Link: Data transmission is immune to interference

Army Materiel Development and Readiness Command,
Alexandria, VA.
Jul 84 *(B)*

A report describes two types of fiber-optic links that provide electrical isolation and noise immunity to connections between microwave sensors and remote instruments. A prime requirement was that the transmitter and detector be small so that they can be placed in confined areas. The instrumentation system measures the microwave signals leaking into partially-shielded electronic packages. The link was developed by Harry Diamond Laboratories. The transmitter is the size of a gum eraser. The detector is a compact avalanche photodiode. The fiber-optic link is intended for use with pulse-modulated microwave sources.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A126550/NAA, price code: A02, or contact project officer James C. Blackburn (202) 394-3180.

0182 Field Repairs of Optical-Fiber Communication Links: Fixture allows splicing with minimal skill

Army Materiel Development and Readiness Command,
Alexandria, VA.
Jun 84 *(B, F)*

A document provides a progress report for the U.S. Army Communications-Electronics Command on development of a method for repairing optical-fiber communications cable in the field. The basic approach to repair is to have all the tools in one module, with all prepared cable and fiber lengths determined by preset tool and fixture positions. The field operator will not have to perform precise manipulations of the fibers or tools in preparing the cable splice. A prototype splicer is described in detail. An advanced splicer is being developed.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A126075, price code: A02, or contact project officer Claire E. Loscoe (201) 544-4809.

0183 Frequency-Diversity Reception for Phase Modulation: Signal-to-noise ratio would be improved

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(B)*

A proposed system would receive phase modulation transmitted simultaneously on different carrier frequencies. It could be used for carriers received through different antennas or through the same antenna. The system would normally be used for digital signals. Fixed or variable delay lines, as needed, would be inserted in the channels to equalize the group delays. The signals could be combined at baseband, but are preferably combined by coherent summing at the intermediate frequency for improved signal-to-noise ratio.
FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15040/TN.

New Time Dissemination Service Available
See 0539

0184 NRZ Data Asymmetry Corrector and Convolutional Encoder: Circuit compensates for timing, amplitude, and symmetry perturbations
National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(A, B)*
A system using an asymmetry corrector circuit with a convolutional encoder receives NRZ-L-M-S data (nonreturn-to-zero data in level, mark, or space convention) and clock signals at rates of 2 to 50 megabits per second; compensates for signal variations, such as data and clock asymmetry, phase errors, and amplitude variation; and convolutionally encodes the data for transmission at 4 to 100 Mb/s.
FOR ADDITIONAL INFORMATION: Inquiries concerning rights for the commercial use of this invention should be addressed to Marvin F. Matthews, Lyndon B. Johnson Space Center, Mail Code: AL-3, Houston, TX 77058; (713) 483-4871. For others contact Technology Transfer Division, P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to MSC-20187/TN.

0185 NRZ Data Asymmetry Corrector and Convolutional Encoder: Circuit compensates for timing, amplitude, and symmetry perturbations
National Aeronautics and Space Administration,
Washington, DC.
Sep 84 *(A, B)*
A system using an asymmetry corrector circuit with a convolutional encoder receives NRZ-L-M-S data (nonreturn-to-zero data in level, mark, or space convention) and clock signals at rates of 2 to 50 megabits per second; compensates for signal variations, such as data and clock asymmetry, phase errors, and amplitude variation; and convolutionally encodes the data for transmission at 4 to 100 Mb/s. The system was extensively tested using data and clock signals simulating 'worst-case' timing.
FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20187/TN.

0186 Optical Coupler/Decoupler Communication Module: Design uses efficient, high-resolution-wavelength multiplexer
Army Materiel Development and Readiness Command,
Alexandria, VA.
Aug 84 *(B)*
An optical module couples energy into and decouples energy out of a single optical transmission line, using a minimum of four wavelengths for the simultaneous full duplex transmission of four optical channels. The principal building block of the module, which is being developed for the U.S. Army Communications-Electronics Command, is a miniature planar spectrometer that eliminates the need for collimating optics, prisms, or thin-film filters. The planar coupler/decoupler consists of a low-loss planar optical waveguide with cylindrical surfaces at its ends. Two basic types of coupler/decouple configurations are possible that use the planar spectrometer. In either case, the design requirements are for a throughput loss of less than 5 dB/channel per pass, and crosstalk less than -35 dB of the signal.
FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A129639/NAA, price code: A03.

0187 Radio-Frequency and Wideband Modulation Arraying: The summing network receives coherent signals from all the receivers in an array
National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(B)*
A method sums the narrow-band radio-frequency (RF) carrier powers and wide-band spectrum powers of an array of separate antenna/receiver systems designed for phase-locked-loop or suppressed-carrier operation. The group delay of the separate antennas and RF systems is equalized by settable acoustic surface-wave delay lines in the intermediate-frequency stage of each receiver and vernier controlled by delay servo loops, each operating from a digital controller. The controlled delay is thus adjusted to provide phase-correlated signals at the spectrum summing junction, which combines the spectrum power outputs of all the receivers in the array.
FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15030/TN.

0188 Receiver for Antenna Arrays: A scheme to obtain an amplified, demodulated output
National Aeronautics and Space Administration,
Washington, DC.
Apr 84 *(B)*
A diversity-reception system originally developed for use aboard spacecraft combines narrow-band signals from several antennas to yield an amplified demodulated signal. The net power gain for a two-receiver array is 3 dB. The system has two IF stages in each receiver section. The phase-modulated signal outputs of the second IF sections of both receivers are combined, with proper adjustment for phase differences using a phase tracking loop, and are injected into the second IF section of one receiver, which is called the master section.
FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15089/TN.

0189 Report Reviews Prediction Of Microwave Attenuation By Rainfall
Department of Commerce, Washington, DC.
Dec 84 *(B, J)*
The National Telecommunications and Information Administration has released a report that evaluates prediction models for microwave attenuation by rainfall. In the report, the present status of predicting is reviewed, identifying the current difficulties, objectives, and achievements. The major difficulties hindering further progress, according to the

report, are those of: inadequately summarized observational data for comparison with prediction models, a lack of clear criteria for the acceptance of prediction models, and rational measures for ranking competing prediction models. The report proposes quantitative summary procedures, acceptance criteria, and ranking measures. With the aid of such, the potentially massive task of comparisons of observations and predictions becomes feasible. The report includes an application of regression summaries, a description of prediction essentials and recommendations for model evaluation.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB84-182104/NAC, price code: A03. Other information is available by writing to the National Telecommunications and Information Institute, U.S. Department of Commerce, Boulder, CO 80303. Refer to report NTIA 84-145.

Rounding Technique for High-Speed Digital Signal Processing: An arithmetic technique facilitates high-speed rounding of 2's-complement binary data
See 0215

0190 Shuttle Communications Blackout Study: The RF power loss through a three-dimensional plasma sheath is computed
National Aeronautics and Space Administration, Washington, DC.
Jan 84 *(A, B)*

The atmospheric reentry and landing of the Space Shuttle orbiter require precise targeting control from the deorbit point to ground touchdown. Radio communications with the orbiter during this time period are critical to provide accurate state vector updates for vehicle guidance programs. The Space Shuttle Orbiter Entry Communications Blackout Study computer program models, investigates, and predicts communication blackout envelopes based on mission entry trajectory and associated data from tracking stations. It should be of interest to those designing and using communications systems susceptible to blackout. The program can be readily adapted to predict the entry communications blackout for any nonablative entry vehicle.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to MSC-20141.

Stabilizing Fiber-Optic Transmission Lines: A voltage-controlled optical phase shifter is the key
See 0292

0191 Two-Wire to Four-Wire Audio Converter: A simple circuit provides an interface between normally incompatible voice-communication lines
National Aeronautics and Space Administration, Washington, DC.
Feb 84 *(B)*

A compact circuit enables the inter-connection of two-wire and four-wire voice communication lines. The new converter employs standard circuitry and components. It is adaptable to many other two-to four-wire applications such as telephone answering devices and voice-controlled computers. When a two-wire voice-communication line must connect with a four-wire line, the hybrid adapter furnished by the telephone company will not always do. The hybrid may not be suitable for the impedances of the lines. Such was the case at the Kennedy Space Center News Facility, where it was necessary to connect television cameras having two-wire equipment to a four-wire audio network that extends to remote locations. The converter replaces a large and cumbersome unit, a junction box that linked a television van to a long extension cable on the camera operator's headset.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: KSC-11256/TN. Inquiries concerning rights for the commercial use of this invention should be adressed to James O. Harrell, John F. Kennedy Space Center, Mail Code: SA-PAT, Kennedy Space Center, FL 32899; (305) 867-2544. Refer to KSC-11256/TN.

0192 VHF Frequency-Hopping Multiplexer: Flexible design expands transceiver performance
Army Materiel Development and Readiness Command, Alexandria, VA.
Jun 84 *(B)*

Recent work has demonstrated the feasibility of a frequency-hopping multiplexer (FHMUX) that permits the operation of up to five VHF transceivers through a common wideband antenna. The design, capable of 30- to 88-MHz frequency range, was developed and evaluated for the U.S. Army Communications-Electronics Command. A building-block configuration in which the operating frequency range is split into two ranges, 30 to 50 MHz and 50 to 88 MHz, was found to be the best design approach for the FHMUX.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A126736/NAA, price code: A17 or contact project officer Donn Campbell (201) 544-5765.

Voice Operated Controls and Switches are Developed
See 0067

COMPUTER TECHNOLOGY & SOFTWARE

Advanced System for Process Engineering
See 0086

Air Force Develops Subjective Workload Assessment Technique
See 0040

Analysis of Short-Rotation Forests: Economic strategies are evaluated
See 0892

Asbestos Removal And Disposal Information System
See 0385

0193 Automatic Flowsheet Layout: Software package provides instructions for an automatic drawing machine
Department of Energy, Washington, DC.
Jan 84 *(A, G)*

A computer-program package automates the layout of process flowsheets. Given a list of the equipment items in the flowsheet, their symbol codes, stream-connection topology, and aggregation of items into process sections, the package will deduce the location of the equipment symbols in the drawing space, lay out the streams connecting the symbols, position peripheral flowsheet symbols and information, and produce a data file to be executed by a graphics device. The package consists of two independent programs: (1) PFL-11, the equipment-layout logic; and (2) PFD-11, the stream-layout and flowsheet-drawing portion. The former program uses concepts and techniques from graph planarity-testing methodology; the latter program uses novel path-structure classification methods. The programs are written completely in FORTRAN. They are transportable and can readily be adapted for use with a variety of graphics software.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-017095, price code A04.

Axial Compressor Design and Analysis: Program yields blade configurations and aerodynamic flow fields
See 0594

Boundary-Layer Equations for Two-Dimensional and Axisymmetric Flow: Finite-difference procedure solves for laminar, transitional, or turbulent flows
See 0957

BURST - A Computer Program of a Meteor Burst Communications Model Used to Predict the Reliability of a Communications System That Uses Meteor Bursts as the Communications Channel
See 0177

Calculating the Flow Field in a Radial Turbine Scroll: Finite-difference and finite-element methods give glow solutions
See 0160

Coding for Single-Line Transmission: Scheme for code generation and conversion has only modest equipment requirements
See 0178

Compressible Flow About Wind Turbine Blades: Program solves the three-dimensional potential equation for flow through an arbitrary rotor
See 0313

Compressible Stability Analysis Code for Transition Prediction in Three-Dimensional Boundary Layers: Black box code for swept and tapered wings
See 0005

Computer Aided Structural Engineering Project Develops
See 0070

Computer Energy Time Unit Devised
See 0459

Computer Model Developed to Help Predict Solutions to Electrostatic Precipitators Problems
See 0390

Computer Program Available To Calculate Fluid Properties
See 0094

Computer Program for Chemically Reactive Fluid Flow: Program solves the equations of transient multicomponent chemically reactive fluid dynamics
See 0960

Computer Program Simulates Room Fires and Estimates Safet Egress Time
See 0071

0194 Computer Programs Have Been Developed for Nonlinear Least Squares

Department of Commerce, Washington, DC.
Oct 84 *(A)*

Statisticians and data analysts will be interested in STARPAC (the Standards Time Series and Regression Package), a library of Fortran subroutines for statistical data analysis developed by the National Bureau of Standards Statistical Engineering Division. The first installment of STARPAC consists of state-of-the-art algorithms for unconstrained nonlinear least squares. These subroutines provide a number of features designed to facilitate their use, including carefully designed user documentation, several levels of user-control of the computations, extensive error handling facilities, and comprehensive printed reports.

FOR ADDITIONAL INFORMATION: For information on the project or for obtaining a magnetic tape of the program, please contact Ms. Janet Donaldson, National Bureau of Standards, 325 Broadway, Mail Code 714, Boulder, CO 80303; (303) 497-5114.

0195 Computer Readability Editing System Developed

Department of the Navy, Washington, DC.
Jul 84 *(A)*

A computer readability editing system (CRES) was developed by the Training Analysis and Evaluation Group, now part of the Naval Training Equipment Center (NTEC). It serves as an author's aid in improving the ease of comprehending technical manuals and training material. The system has features to flag uncommon and misspelled words, flag awkward or long sentences, suggest simple replacements for difficult words and phrases, calculate the readability grade level, and keep track of a variety of specialized words, such as acronyms, abbreviations, and mandatory technical words. Each feature was tested to verify that it provides useful feedback to editors and authors. Probably the most important feature of CRES is vocabulary control. Analysis of a passage is done on a word-by-word basis. If the word is not found in a word list, it is flagged and also listed in the analysis printout. Several word lists are searched. The program was originally developed in WANG BASIC-2, but is now available in a variety of computer language for many types of computers. The best current version of the program runs on the WANG VS100 computer.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, Virginia 22448. Refer to 080904/TN.

Computer Simulates Organogenesis
See 0851

0196 Configuration Analysis Tool: An interactive program for storing information and generating reports on project configuration management

National Aeronautics and Space Administration,
Washington, DC.
Jan 84 *(A)*

The Configuration Analysis Tool (CAT) is an information storage and report generation system for the aid of configuration management activities. Configuration management is a discipline composed of many techniques selected to track and direct the evolution of complex systems. CAT is an interactive program that accepts, organizes, and stores information pertinent to specific phases of a project. CAT is written in FORTRAN IV Plus and Assembler for interactive execution.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to GSC-12710.

0197 Connecting Separate Computers to a Common Bus: A network bus adapter handles protocols for computer-to-computer communications

National Aeronautics and Space Administration, Washington, DC.

Oct 84 *(A, B)*

Individual network bus adapters (NBA's) connect computers, microprocessors and minicomputers, and terminals to a common global bus, a twin-axial cable. Communication is in accordance with the standard protocol, even though the host devices operate at different rates and under different protocols. An NBA does all the protocol handling and communication with the bus for its host computer, such that processors of different speeds can send data to each other continuously at their maximum speed.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning license for its commercial development should be addressed to Paul F. McCaul, NASA Resident Office-JPL, Mail Code: 180-601, 4800 Oak Grove Drive, Pasadena, CA 91103; (213) 354-2700. In either case refer to NPO-15433/TN.

0198 Control of Self-Replicating Systems: Three concepts are proposed for system management and control

National Aeronautics and Space Administration, Washington, DC.

Oct 84 *(A)*

A proposed addition to a model for self-replicating systems includes concepts for three hierarchical levels of management and control. The concepts are: (1) an internal system for autonomous management and control, (2) a separate system for environment monitoring, and (3) an optional intelligent system that would be required in especially chaotic environments.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25865/TN.

Crash Simulation and Nonlinear Structural Analysis: Behavior of structures composed of trusses, frames, and membranes is modeled

See 0006

Design of Multistage Axial-Flow Compressors: Computer program develops blading geometry and performance parameters

See 0617

0199 Digital Filters for Two-Dimensional Data: Computationally efficient filters speed the processing of two-dimensional experimental data

National Aeronautics and Space Administration, Washington, DC.

Sep 84 *(J)*

A set of digital data filters known as two-dimensional convolute integers is especially suited for efficient computer analysis of two-dimensional experimental data or of images. Each use of such a filter requires only integer multiplications, a summation, and a single normalizing division. Regression calculations were required to generate the filters but are not required to use them. The use of such a filter gives a result equivalent to that of fitting a power-series expansion to the data in the vicinity of each data point to determine a smoothed value either for the data point or for one of its partial derivatives, depending on the filter used. The numerical filtering methods used in digital optical image processing are also useful in analyzing other two-dimensional experimental data; for example, time-resolved spectroscopic data in which intensity is a function of wavelength and time.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25790/TN.

Dissociated Airflow Effects During Plasma-Arc Testing: Program computes heating rates and surface-friction effects

See 0008

Extended Vortex Lattice Method: Aerodynamic characteristics are determined for up to four complex planforms

See 0009

0200 Extending the Memory of Microcomputers: Memory is increased while retaining real-time capabilities

National Aeronautics and Space Administration, Washington, DC.

Dec 84 *(A)*

Extra memory capacity can be added to a microprocessor without increasing the memory address length and without special transfer instructions. It is done by dedicating a block of space in the main memory to hold the addresses of locations in the extra memory. A special circuit added to the microcomputer recognizes commands that signify the use of the extra memory. The extra memory block is then substituted on the address bus for the base memory. The commands are then executed on the contents of the extra memory, rather than on the contents of the main memory.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for the commercial use of this invention should be addressed to Paul F. McCaul, NASA Resident Office-JPL, Mail Code: 180-601, 4800 Oak Grove Drive, Pasadena, CA 91103; (213) 354-2700. In either case refer to NPO-15295/TN.

Fast Generation of Boundary-Conforming O-Type Grids: Algorithm generates grids for arbitrary wing-body and axial turbomachinery geometries

See 0010

Flexible Method for Analyzing Bird Band Recovery Data

See 0858

Flow Over Nonaxisymmetric Nozzles: Code solves three-dimensional Navier-Stokes equations

See 0966

Flow Through a Rotating Turbomachinery Blade Row: Full potential, transonic quasi-three-dimensional flow is calculated

See 0163

Forest Resource Information System: Twenty-three processing functions aid in utilizing LANDSAT data for forest resource management

See 0910

0201 Generating Random Number Pairs: An algorithm generates pairs drawn from a bivariate normal distribution

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(J)*

An algorithm generates random numbers drawn from a bivariate normal distribution with any desired values of the two means, two standard deviations, and correlation coefficient. A sequence of pairs of random numbers uniformly distributed between 0 and 1 are transformed by scale-factor multiplications and rotations to obtain a sequence of random number pairs that are bivariate normally distributed. The algorithm is a special case of a general method for generating sequences of random n-vectors drawn from a multivariate normal distribution with any desired covariance matrix.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-27039/TN.

0202 Graphics Software for Block Diagrams: Versatile program makes generating complex diagrams easy

Army Materiel Development and Readiness Command,
Alexandria, VA.
Sep 84 *(A)*

An interactive software program is available for creating and modifying block diagrams and pictures on a computer graphics terminal. The program, developed by the Harry Diamond Laboratories, offers the user great flexibility in generating the diagrams and an extensive list of support commands for editing, storing, and printing them. Eight different symbols can be used with the program including straight lines, circles, arcs, diamonds, arrows, and boxes along with user-defined symbols. The symbols are placed in the diagram by specifying two points on the screen and inserting the desired symbol between them. The points can be picked with a cursor using terminal thumbwheels, a joystick, the appropriate arrow keys, or an optical pen, depending on the type of graphics terminal used. The program is also able to produce a variety of artistically-styled character fonts. They include 14 different type styles and 7 different alphabet styles ranging from Roman and Greek to italicized and mathematical characters. All entries can be drawn with varying line textures in up to 255 colors..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A126637/NAA, price code: A02.

0203 Guide Helps Evaluate Computer Security

Department of Commerce, Washington, DC.
Sep 84 *(A)*

Probably as important as having a general computer security program, is being assured it meets an organization's specific security requirements. The Institute for Computer Sciences and Technology at the National Bureau of Standards has developed a guide designed to give managers a structured way of determining whether their computer security safeguards are adequate for their individual needs. Guideline for Computer Security Certification and Accreditation is designed especially to help protect highly sensitive computer systems and data, but it can be used for less sensitive systems as well. The Federal Information Processing Standards publication (FIPS PUB 102) details steps on how to establish and carry out a certification and accreditation program. It also discusses evaluation techniques which can be used, including risk analysis; validation, verification, and testing; EDP audit; and security safeguard evaluation.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: FIPS-PUB-102/NAC, price: $11.50.

0204 Harmonic-Balance Algorithm for Nonlinear Systems: Limit cycles are identified in systems with multiple nonlinearities and multiple paths

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(J)*

A new algorithm finds limit cycles in autonomous control systems with both linear and nonlinear elements in several forward signal paths. By 'autonomous' is meant a feedback system operating with zero input control signal. The new algorithm does not make a priori linearizing and low-pass-filtering assumptions about the response of nonlinear elements; rather, these approximations are deferred to a later point in the analysis. It is based on the harmonic-balance method, in which it is assumed that when a system is in a limit cycle, the signal at every point is periodic with the same fundamental frequency.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25821/TN.

0205 IBM Channel to PDP11 Interface: An interface permits bidirectional data transfer between the two systems

Department of Energy, Washington, DC.
Mar 84 *(A, B)*

A new interface communicates between the DEC PDP 11 UNIBUS and the I/O (input/output) channels of the IBM 360/370 computer triplex at the Stanford Linear Accelerator Center. Called a control unit, the interface looks like a tape or a disk drive to an IBM computer. This means that any ordinary batch job can transfer data to or from the unit connected to a UNIBUS. The programmer gets access to the system by a FORTRAN-callable subroutine. This control unit permits bidirectional data transfer at up to 1 MB/s between an IBM 2860 selector channel and a PDP11 minicomputer. A unit called IBM channel simulator has been designed to troubleshoot or debug control units normally attached to an IBM channel.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: SLAC-TN-80-5, price code: A02.

0206 Information-Systems Data-Flow Diagram: A single form presents a clear picture of an entire system

National Aeronautics and Space Administration,
Washington, DC.
Mar 84 *(A)*

Any information system is described by inputs, outputs, and associated processes. The interface between these parameters is depicted graphically in an easy-to-use form that is independent of the specific data-base structure and applications. The form, which gives a relational review of data flow, is well suited to information-system planning, analysis, engineering, and management. It can be used to review the data flow for a developing system or one already in use.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15492/TN.

0207 Interactive Computer Graphics Software: Program offers a wide variety of features

Army Materiel Development and Readiness Command,
Alexandria, VA.
Apr 84 *(A)*

The Interactive Graphics Plotting System (IGPS) is a computer graphics program written in BASIC for desktop computers that generates high-quality plots of two-dimensional data. The software, developed by the U.S. Army Materiel Systems Analysis Activity, can be used to produce slides or graphs for technical reports and presentations. It offers wide flexibility in graphics formatting. Curves can be plotted on linear, semilogarithmic, or full logarithmic scales and on a variety of probability distribution coordinates, including uniform, normal, lognormal, Rayleigh, Weibull, or user-defined. Axes can be labeled uniformly or under user control; and either solid-dashed-dotted- or mixed-line types can be used.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A120417, price code: A05.

Interactive Graphics Analysis for Aircraft Design: Aircraft geometry is displayed on an interactive terminal
See 0011

0208 Large-Scale Software Management System: Changes are organized and controlled according to consistent procedures

National Aeronautics and Space Administration,
Washington, DC.
May 84 *(A)*

The system for organizing support software for the Space Shuttle launch-processing system may be adaptable to other systems where control of change and prevention of unauthorized changes is a primary concern. It is especially suited to a multi-flow environment, in which there is more than one version of each software module. In the new system, baseline libraries containing source and object programs, load modules, and job-control language are maintained by a configuration-management subsystem.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: KSC-11230.

Lift Effect of Cambered Calculating the Vortex-Wings: Program computes the vortex-lift effect by using an improved supersonic suction analogy
See 0012

Linear Control System Design Analysis
See 0263

0209 Linking Smart Modules by a Single Channel: System architecture brings order to a potentially chaotic situation

National Aeronautics and Space Administration,
Washington, DC.
Jul 84 *(A, B)*

A new configuration allows many smart modules (each containing memory and a microprocessor) to be linked by a common data channel. The architecture allows each module to carry on its own operations at its own data rate within a block of time, while communications between modules occur in strict synchronism. Because smart modules process their own data to a limited extent, they reduce the quantity of data that must pass between modules. The entire system is synchronized at 15 pulses per second by a real-time interrupt (RTI) pulse.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Division, P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to Robert F. Kempf, NASA Headquarters, Code GP-4, 400 Maryland Avenue, S.W., Washington, DC 20546; (202) 755-3954. In either case refer to NPO 15342/TN.

Liquid Pathway Dose Calculations (LADTAP2)
See 0866

0210 Measuring Software-Execution Time: Test circuit times routines even during multiprogram operation

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(A, B, K)*

A test circuit measures software-execution time. The circuit generates a pulse that is started by a signal at the beginning address of the program under test and is ended by a signal at the ending address. The pulse duration is measured with a logic analyzer to determine the execution time. The input signals for the tester are obtained from a memory-controller circuit board of the CPU. The circuit is built around two sets of comparators that trigger on the starting and stopping addresses.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: KSC-11267/TN.

Memory-Efficient Energy Network Has Been Developed
See 0355

Minimum Induced Drag of Nonplanar Wings: Numerical optimization techniques calculate the required bound-circulation distribution
See 0013

Monte Carlo Investigation of Trajectories: Orbital sequences are modeled, simulation statistics generated, and user-requested variables scanned
See 1004

Multiple-Image Holographic Matched Filter: New technique for making holograms greatly increases storage density
See 0975

New Program Will Analyze Microelectronic Test Data
See 0274

0211 Non-linear Regression Program Developed

Department of the Navy, Washington, DC.
Jun 84 *(A)*

The Naval Health Research Center of San Diego and the Naval Medical Research and Development Command of Bethesda have published a report that documents a general non-linear regression program for fitting data to non-linear models. One modeling application which appears repeatedly in bio-medical research is that of predicting an outcome on the basis of experience. This statistical method, known as regression analysis, requires that a functional relationship between the dependent and independent variables be specified. This new program documented in the report is written in the BASIC language common to most microcomputers. The program has been adapted for use on several stand-alone microcomputer systems including the Wang 2200 series, the Radio Shack TRS-80 Models I and II, and the Apple II. This report gives examples and program output based on a demonstration data set involving antigen-antibody complexation in solution. Two derivations of function subroutines are given to assist the user in developing his own functions. A complete listing of the necessary programs is given along with a section on program cautions.

FOR ADDITIONAL INFORMATION: Contact: Dr. Dennis P. Nelson, Naval Health Research Center, P.O. Box 85122, Code 30, San Diego, CA 92138, (714) 255-2061. A copy of the technical report is available from NTIS, order number AD-A126840/8, price code A03.

0212 Non-Linear Regression Program Fits Data to Non-Linear Models: Personal Microcomputers Used

Department of the Navy, Washington, DC.
Sep 84 *(A)*

A general non-linear regression program for fitting data to non-linear models has been analyzed at the Naval Health Research Center (NHRC). The program, written in the BASIC language common to most microcomputers, has been adapted for use on several, stand-alone, microcomputer systems, including the Wang 2200 series, the Radio Shack TRS-80 Models I and II, and the Apple II. NHRC's program supplies subroutines in BASIC for the zeroing, transposing, and inverting of the required matrices. If the program is to be used on equipment which supports matrix operations, the matrix subroutine calls can be replaced with the corresponding matrix keywords.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, VA 22448. Refer to 090503/TN.

Nonlinear Stress Concrete Structures Program
See 0078

PANEL Code for Planar Cascades: Plane cascade flow is solved using improved surface-singularity methods
See 0169

0213 PCG Software for Producing Computer Graphs

Department of Agriculture, Washington, DC.
Oct 84 *(A)*

The graphical representation of equations or data is often a practical method of understanding and explaining complex relationships. With the graphing capability of computer programs such as VERSAPLOT, complex graphs can be accurately and rapidly produced. However, without a standard method of organizing several equations or programs, writing the necessary FORTRAN statements required by VERSAPLOT is time consuming. P-C-G was written to provide a standard, yet flexible method of organizing equations, data, or specialized programs which can be used by VERSAPLOT to produce a graph. P-C-G is a computer program that accepts input, processes it, and produces printed output and a graph. It is written in FORTRAN IV and has been run extensively on an IBM 3031. In addition to the computer, P-C-G requires an off-line Versatec plotter with the associated library subroutines. With a modest amount of additional effort, the program can be converted for use on similar sized computer systems utilizing a VERSAPLOT (or CALCOMP) plotting package.

FOR ADDITIONAL INFORMATION: The program is available from Engineering Research Unit, G. W. Andrews Forestry Sciences Laboratory, U.S. Forest Service, Devall Street, Auburn University, AL 36849; (205) 887-7542.

0214 Portable General Purpose Computer: Battery-operated, portable computer system features full computing capability on-site

Department of Energy, Washington, DC.
Nov 84 *(A)*

A battery-operated, portable computer system, the WC-11, developed jointly by the Los Alamos National Laboratory and the Digital Equipment Corp. (DEC), has received an IR 100 award from Industrial Research and Development Magazine. Starting with the original objective to develop a small but powerful computer that could be used onsite to control, interrogate, and analyze data from field instruments, the WC-11 grew into a powerful general-purpose computer. The heart of the computer system is the DEC T-11 microprocessor. This 16-bit processor utilizes the same instruction set as the PDP-11 family of computers. The bubble memory serves as a nonvolatile mass-storage device. High-level languages are available.

FOR ADDITIONAL INFORMATION: Contact: M.A. Wolf and J.M. Crowell, Los Alamos National Laboratory, Los Alamos, NM 87545; (505) 667-2761.

Predicting Aircraft Noise Levels: Program predicts noise levels from data on fan, combustor, turbine, and airframe sources
See 0017

Random Life Curves for Common Engineering Materials: Program incorporates non-Rayleigh effects in evaluating structure life
See 0984

0215 Rounding Technique for High-Speed Digital Signal Processing: An arithmetic technique facilitates high-speed rounding of 2's-complement binary data

National Aeronautics and Space Administration,
Washington, DC.
Mar 84 *(A)*

Conventional rounding of 2's-complement numbers presents problems in high-speed digital circuits because it requires an adding operation. An alternate approach is truncation, which is not suitable when a large number of digital samples has to be accumulated because it produces a fairly-large mean error. The proposed technique consists of truncating $k + 1$ bits and then attaching a bit in the least significant position.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15307/TN.

0216 Security Package for the VAX: Four programs deal with intruders and resource management

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(A)*

A package provides the DEC VAX-11/780 with certain 'deterrent' security features. Although the package is not a comprehensive security system, it should be of interest for any VAX installation where security is a concern. The VAX security package has four parts: Two deal with resource management, and two deal directly with intruders. The programs in this computer security package are written in

FORTRAN IV and MACRO Assembler for real-time and interactive execution. They have been implemented on a DEC VAX-11/780.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to MSC-20423/TN.

Sharp-Focus Composite Microscope Imaging by Computer: Enhanced depth of focus aids medical analysis
See 0561

Shock-Free Airfoil Cascades: Fast design and analysis uses fictitious gas concept
See 0988

Shuttle Communications Blackout Study: The RF power loss through a three-dimensional plasma sheath is computed
See 0190

Shuttle Inventory Management: All supply activities and requirements are controlled from a single point
See 1007

Simulating Mechanical Control Operations: A computer model can simulate mechanical harvesting operations using any specific mechanical system operated in any realistic environment
See 0887

0217 Software For Image Manipulation

Department of Commerce, Washington, DC.
Jan 84 *(A, E, K)*

Computer software has been developed for use in interactive image analysis of satellite data for quantitative analysis, zoom, graphing, arithmatic manipulations, and slicing one channel into color. The software is written in FORTRAN and MACRO 11 and is designed specifically for use on the DeAnza IP5000 Imaging System. However, the program listings may prove useful in the development of software for other systems. An asset of this program is its versitility and flexibility in image enhancement and data manipulation. Other possible applications include interactive analysis of any two dimensional image or display that can be converted to a digital format. Examples are medical images, microscope or x-ray images, and aircraft imagery.

FOR ADDITIONAL INFORMATION: Contact: P. B. Atkinson, NOAA/NESDIS/ORTA, Mail Stop (D), FB No. 4, Room 3308, Suitland, Maryland 20233; (301) 763-2418. Refer to 83/NESDIS/023.

0218 Software Programs for Multiple-Line Plots: Superimposed plots of several data files can be made

Army Materiel Development and Readiness Command, Alexandria, VA.
Oct 84 *(A)*

A set of four graphics programs is available for generating multiple-line plots of different sets of data on a desktop computer. The programs, developed for the U.S. Army Armament Research and Development Command, are written in the BASIC language, and are independent programs rather than subroutines so that they can be used separately or in combination. The first of the routines is the driver program, which establishes the communication link between the different graphics options and a central data analysis program. The second program generates the multiple-line plot of many different data files on one set of axes. The program is useful for plotting data that are similar in magnitude so that trends, means, and standard deviations can be computed. For data files that do not have overlapping axis scales, a third program can be used for making comparisons that automatically compensate for the disparity. The fourth program uses a double Y-axis format for plotting dissimilar data over the same X-axis span..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A126650/NAA, price code: A03, or contact project officer Melinda B. Krummerich (301) 278-6128.

0219 Software Specification Language: SSL translator aids in developing and checking software systems

National Aeronautics and Space Administration, Washington, DC.
Sep 84 *(A)*

The Software Specification Language, SSL, aids in the process of decomposing software functions into subfunctions or, equivalently, systems into subsystems. The principal goal of SSL is to provide a form of verification and consistency checking early in the design phase. Secondarily, it may serve as a formal document with which to communicate the software architecture to the detailed designers. Since SSL is a nonprocedural language for which a formal syntax and semantics exist, it was possible to develop an automatic translator. SSL minimizes barriers to creativity on the part of the designer while encouraging 'good' programing practices. The translator is written in FORTRAN IV Level H and OS Assembler for batch execution.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to MFS-23737/TN.

0220 Software Specifications Adopted by ANSI Committee

Department of Commerce, Washington, DC.
Jun 84 *(A)*

Draft specifications for data dictionary systems (DDS) developed by the NBS Institute for Computer Sciences and Technology have been adopted by American National Standards Institute (ANSI) Technical Committee X3H4 as the base document for an Information Resource Dictionary System standard. NBS will work with the ANSI committee to issue the specifications as a draft voluntary industry standard at the same time that they are proposed as a Federal Information Processing Standard (FIPS). The specifications enable users to define the features and functions required in a DDS. A software tool for managing data resources, a DDS can help organizations improve integrity and consistency of data. The development of the specifications has been working with federal agencies, private industry computer users, computer software suppliers, academic groups, and voluntary standards organizations.

FOR ADDITIONAL INFORMATION: Contact: Jerry Winkler, (703) 425-4558, AOG Systems Corp., P.O. Box 2308, Fairfax, VA 22031.

Solutions of Transonic Flow in Turbomachines: Accurate approximations are obtained using perturbation techniques
See 0368

Solutions of Transonic Flow in Turbomachines: Accurate approximations are obtained using perturbation techniques
See 0717

0221 Spare Parts Inventory Control System Software
Department of Energy, Washington, DC.
Oct 84 *(A, G)*

The Spare Parts Inventory Control System (CPDREV) was developed to determine proper stock levels for an inventory of process spare parts. The program determines the amount of material to buy, and when it should be bought. CPDREV can compute an implied risk from a prespecified penalty cost, or conversely, the implied penalty cost from a prespecified risk level. The frequency of reordering is computed to provide a basis for distributing the projected workload among buyers and expeditors and to avoid an overstocked inventory. CPDREV is designed to assist maintenance managers in preparing spare parts purchase recommendations. CPDREV assumes that the inventory item has a predictable sales life, and that the transition costs of passing from one order period to the next consist primarily of the order costs, the inventory carrying costs, and the penalty costs caused by backordering customer requests..

FOR ADDITIONAL INFORMATION: Contact: NTIS Computer Products Center, National Technical Information Service, Springfield, VA 22161; (703) 487-4763. Refer to DE83-048947/TN.

Steady, Nonrotating, Blade-to-Blade Potential Transonic Cascade Flow Analysis Code: Program numerically solves an artificially time-dependent form of the actual full-potential equation
See 0991

Subcritical Wing Design Code: program uses higher-order far-field drag minimization
See 0018

Thermal Elastohydrodynamic Lubrication of Spur Gears: Program and analysis predict lubricant film thickness and the variations of dynamic load and temperature
See 0838

Thermal Modeling of Bridgman Crystal Growth: Heat flow is modeled for a moving or stationary rod-shaped sample inside a directional-solidification furnace
See 0994

Thermal Radiation Model Renodalization: Simplified radiation models reduce programing cost
See 0995

Time-Domain Modal Vibration Identification: Natural frequencies, damping factors, and damped mode shapes are identified
See 0996

Transonic, Axisymmetric Flow Over Nozzle Afterbodies With Supersonic Jet Exhuasts: Predictions require less computation than the Navier-Stokes solutions
See 0019

Vibration Analysis Reduces Computer Time: Calculation cost is reduced without loss of accuracy
See 0998

Video Disks Make Maps Manageable
See 0933

0222 Visual Database Conversion Program Developed
Department of the Air Force, Washington, DC.
Nov 84 *(A)*

The Operations Training Division has developed and successfully applied a program that can convert visual databases from one simulator system to another. The development of databases for computer image generation systems is a time-consuming, labor-intensive process. Currently, each real-time visual system uses a database with a unique format. This is necessary to retrieve the information contained in the database most efficiently. However, although different formats are used, the databases for various systems contain the same basic information. This information includes the difinition of the shape, location, and color of each object in the environment. Thus, it is possible to use the information contained in the database of one visual system to create a database formatted for another visual system. The database conversion requires the use of a database with a generic format as a core. Two programs have been written for each visual system that a database is to be converted to or from.

FOR ADDITIONAL INFORMATION: Contact: Pat Widder, AFHRL/OTA, Williams AFB, AZ 85224; (602) 988-6561.

0223 VLSI Unit for Two-Dimensional Convolutions: Proposed chip could be used for a variety of functions
National Aeronautics and Space Administration, Washington, DC.
Jul 84 *(A, B)*

A proposed very-large-scale integrated-circuit (VLSI) chip would be a building block in a computer to perform rapid two-dimensional cyclic convolutions. Calculations of this type are essential to image-processing synthetic-aperture radar and digital-signal processing. The new system would implement a fast polynomial transform and eliminate the complicated matrix-transpose operation that must otherwise be performed in fast-Fourier-transform techniques. In the proposed system, a fast polynomial transform technique has been extended into a tree computational structure composed of two units: a fast polynomial transform (FPT) unit and a Chinese remainder theorem (CRT) computation unit.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15224/TN.

Wing Subsonic Aerodynamic Performance Estimates: Solution by iteration estimates performance of twisted and cambered wings of arbitrary planform
See 0020

ELECTROTECHNOLOGY

0224 Add-On Shielding for Unshielded Wire: Prefabricated harness shields wires already soldered to connectors
National Aeronautics and Space Administration, Washington, DC.
Mar 84 *(B)*

A fabrication sequence produces a compact braided shield that can be added to unshielded wire already soldered to a connector. The add-on shielding is assembled at a workbench and then slid onto the free end of the unshielded wire. The technique is especially useful for small-diameter wire attached to micro-miniature connectors.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15107/TN.

0225 Band-Pass Amplifier Without Discrete Reactance Elements: Inherent or 'natural' device capacitance is exploited

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(B)*

Two pairs of operational amplifiers and eight resistors are the only discrete devices used to construct a novel band-pass amplifier. Although band-pass and resonant circuits with active elements and feedback are not new, earlier approaches usually require at least one type of discrete reactive element (either capacitive or inductive) among the outboard components. The circuit is based on the reactive component inherent in the gain/band-width behavior of integrated operational amplifiers due to irreducible device capacitances.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning license for its commercial development should be addressed to John O. Tresansky, Goddard Space Flight Center, Mail Code: 204, Greenbelt, MD 20771; (301) 344-7351. In either case refer to GSC-12788/TN.

Binocular Overlap in a Fiber-Optic Helmet-Mounted Display Has Been Completed
See 0041

0226 Blowing Dust Away With Electrostatic Wind: Ionized air molecules drive away contaminants

National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(B, C, D)*

An electrostatic 'wind' sweeps dust away from the vicinity of high-voltage equipment. The wind is generated by a sharply pointed needle held at a voltage in the range from 10 to 25 kilovolts. The high electric field near the needle point releases electrons, which ionize air molecules (primarily oxygen). Repelled by the electrostatic field, the ions sweep dust molecules away. The electrostatic wind prevents dust buildup and subsequent electrical breakdown in powerlines, transformers, switchgears, Van de Graaff generators, electrostatic precipitators, and other high-voltage equipment. It makes periodic cleaning or air blasting unnecessary.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: HQN-10936/TN.

0227 Broadbeam Antenna-System Measurements Have Been Made Easier

Department of Commerce, Washington, DC.
Dec 84 *(B, J)*

Antenna systems engineers will be interested in a new report from the National Bureau of Standards that gives simple, precise equations for lunar diameter, average brightness temperature, flux density, and shape factor. This information is important for using the moon as a standard reference noise source for calibrating broadbeam antennas in the 1 to 10 GHz frequency range. The primary measurement of interest is the antenna gain-to-system noise temperature ratio (G/T).

FOR ADDITIONAL INFORMATION: An Error Analysis for the Use of Presently Available Lunar Radio Flux in Broadbeam Antenna-System Measurements (TN 1073) is available for $2.00 prepaid from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Order by stock no. 003-003-2555-1.

0228 Cable Assembly and Harness Designs: Specifications for wiring harnesses used in severe environmental conditions of combat vehicles met by commercially available materials

Army Materiel Development and Readiness Command,
Alexandria, VA.
Sep 84 *(H)*

Cable assemblies were built for the U.S. Army Tank-Automotive Command that would have service life of 20 years, not cause or support internal vehicle fires, not generate toxic fumes when heated, not chafe when vibrated against nearby surfaces or at installation, withstand misuse or misassembly, improve electrical system interface, and allow greater modification flexibility. Four types of cable design were considered: wire harness, molded assembly, hybrid assembly, and convoluted assembly. Of the cable designs tested, the convoluted assembly constructed in modular form best met the requirements.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A132594/NAA, price code: A02.

0229 Cable Fires Studied

Department of the Navy, Washington, DC.
Oct 84 *(B, H, K)*

The ongoing cable fire studies at the David Taylor Naval Ship R&D Center (DTNSRDC) are part of the Navy's Ship Damage Control Program to develop realistic standards of flammability, smoke, and corrosive products of combustion for shipboard electrical cables, in order to make optimum use of advancing technology of low-flammability and low-smoking cables. The primary objective of the joint work performed at DTNSRDC and the U.S. Naval Academy was to evaluate the Ohio State University Release Rate Apparatus (RRA) for developing and establishing standards. A secondary purpose was to study critical parameters using a statistical method to design the test program and to analyze the results.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, VA 22448. Refer to 090703/TN.

0230 Calibration Markers Produced for Video Camera

Department of the Navy, Washington, DC.
Aug 84 *(B, K)*

A process for producing calibration markers directly on the photoconductor of video camera tubes has been developed by the Naval Weapons Center (NWC), China Lake, Calif. This process includes the use of an Nd:YAG laser operating at 1.06 m with a 9.5-ns pulse width (full width at half maximum). The use of this technology has produced an increase of up to 50 times in the accuracy of geometric measurements derived from video cameras. Through use of a grid of calibration marks produced by this process, the geometric distortion and variable scale factor of a tube type video camera can be compensated for. Video calibration marker spots (VCMS) were formed by a pulsed Nd:YAG laser.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, VA 22448. Refer to 090504/TN.

Computer Models for IC Fabrication: Process simulations are described for computer-aided design
See 0607

Computer Models for VLSI Fabrication Processes: A completely new, advanced computer program is now available
See 0608

0231 Conical Electrical Connectors Aline Easily: Rotational alinement is not critical in a design useful for remote manipulators

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(B)*

New cone-shaped multiple-wire plugs and sockets automatically aline with each other when joined together. They are particularly suitable for remote manipulators and for making connections in 'blind' locations. The plugs and sockets are made from phenolic or other insulating materials commonly used for connectors. Metal contact rings are molded into the plug cone either flush with the conical surface or slightly protruding. The segmented contacting spring rings are molded into the socket cone with the spring segments protruding into the interior space.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to Leon D. Wofford, Jr., George C. Marshall Space Flight Center, Mail Code: CC01, Marshall Space Flight Center, AL 35812; (205) 453-0020. Refer to MFS-25211/TN.

DC Switching System Rapidly Limits and Interrupts Fault Currents
See 0901

0232 Decoupling a Reflecting Layer From Its Support Structure: Proposed mounting isolates the main support through intermediate flexural supports

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(B, D)*

A proposed mounting would decouple the thermal distortions of a reflective surface so that they are not transmitted to the support structure. The reflecting layer consists of aluminum reflecting tiles attached to the support structure by flexural mountings that bend and twist to accommodate the thermal expansion of the tiles. Each flexural support consists of three components: one attached to the main support structure, one attached to the reflective tile -- both are tangentially stiff and one or both are radially soft -- and a support pin that holds the other two components together.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15346/TN.

Design Considerations of Reverberating Chamber
See 0461

Detecting Defective Solder Bonds: The method is noncontact and nondestructive
See 0618

Developing Standards for Photovoltaic Devices: Ground rules are outlined for evaluating photovoltaic technology
See 0468

Digital Phase-Shift Standard: Circuit using just three IC's could be used to perform precise calibration
See 0472

0233 Digital SAR Processor: It produces real-time, single-look, high-resolution imagery

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(B)*

A proposed digital synthetic-aperture-radar (SAR) processor achieves a rate of 400,000 samples per second. The system combines frequency-domain and time-domain processing for a two-dimensional azimuth correlation. A control processor in the SAR provides reference functions and timing circuitry. A range correlator, performs the synthetic-aperture processing. It is a straightforward match filter.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for the commercial use of this invention should be addressed to Paul F. McCaul, NASA Resident Office-JPL, Mail Code: 180-601, 4800 Oak Grove Drive, Pasadena, CA 91103; (213) 354-2700. Refer to NPO-15519/TN.

0234 Digital Single-Phase Power-Factor Controller: Digital circuit has faster response to load changes

National Aeronautics and Space Administration,
Washington, DC.
Jun 84 *(B, F)*

Although it is basically an analog circuit, the power-factor controller operates with better response characteristics if digital components are inserted in the feedback portion of the circuit. The changes eliminate several analog elements including an 8-hertz low-pass filter, making the circuit more responsive to sudden load changes -- such as those encountered during the application of a clutch. Component aging and environmental changes also pose less of a problem with the new design. As in other power-factor controllers, the motor current is varied by changing the turn-on time of a gate-controlled silicon switch in series with the motor and input powerline.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for the commercial use of this invention should be addressed to Leon D. Wofford, Jr., George C. Marshall Space Flight Center, Mail Code: CC01, Marshall Space Flight Center, AL 35812; (205) 453-0020. In either case refer to MFS-25861/TN.

0235 Directional Coupler With Increased Directivity: Diffraction loss is reduced by curving one reflector

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(B)*

A new design for a four-port directional coupler promises to improve directivity while reducing diffraction loss. Intended primarily for use in local-oscillator diplexers (first-mixer inputs), the new design will increase the signal-to-noise ratios and therefore the ranges of millimeter and submillimeter heterodyne receivers. In the improved version, one of the parallel-plate reflectors is replaced by a reflector with a slight toroidal curvature.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15892/TN.

0236 Effect of Cosmic Rays on MSI Devices: Low-power logic devices are susceptible to cosmic-ray particles

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(A, B, J)*

Five MSI (medium-scale-integration) device technologies, including TTL, low-power TTL, Schottky, CMOS, and low-power Schottky, were subjected to a 120-MeV krypton-ion beam from a cyclotron and monitored for single-event upsets. The test results show that low-power TTL and low-power Schottky devices are affected by cosmic-ray nuclei, with the Schottky devices being the most sensitive. The results could find terrestrial application for radiation-hardening of electronic devices and systems.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15779/TN.

0237 Effects of Heavy-Charged Particles on MOS IC's: Although such particles are not troublesome now, they could be in the future

Army Materiel Development and Readiness Command,
Alexandria, VA.
May 84 *(B, J)*

The effects of heavy-charged particles in silicon dioxide films were studied. Such films are of great practical interest because of their role in MOS IC's. They can be ionized by naturally-occurring radioactive particles passing through an IC chip. Sometimes enough charge is collected from the passage to change the state-of-memory elements. In the study, which was conducted by Harry Diamond Laboratories, MOS capacitors were exposed to beams of ions, and the fraction of charge escaping recombination was measured. The study concluded that the charge that is produced by an alpha particle and escapes recombination is unlikely to cause a failure in an IC until the device geometries are in the range of 1 micro m. This size is much smaller than the geometries currently on the drawing boards.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A114713, price code: A05 or contact project officer Timothy R. Oldham (202) 394-1551.

0238 Electric Motors and Energy Consumptions: Cost of energy-efficient motors found to be greater than the savings that would result from their operation

Army Materiel Development and Readiness Command,
Alexandria, VA.
Sep 84 *(C)*

An audit/inventory of all the electric motors one-quarter and greater horsepower was made at an ammunition plant for the U.S. Army Armament Research and Development Command to determine if electrical energy consumption could be reduced. The most significant conclusion drawn after the study was that a case-by-case analysis should be made as existing motors must be replaced. It was found that very few manufacturers provide efficiency data in their sales catalogs, and those that do only provide these data for full-load operation. The report recommends that when motors fail, an analysis should be made to determine if it would be cost effective to replace with an energy-efficient motor.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A130878/NAA, price code: A03, or contact project officer Robert E. Hogan (201) 724-4290.

Electricity Calibration Service For Wattmeters and Watthour Meters

See 0477

0239 Electrolytic Sharpening of Diode-Contact Whiskers: Phosphor bronze wire is pointed without highly-toxic chemical reagents

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(G)*

An improved technique sharpens the point on tiny phosphor bronze wires commonly used to contact Schottky-barrier diodes. The process not only allows control of the cone angle and the diameter of the tip but also employs relatively-nontoxic sulfamic acid. The previous technique involved chromium trioxide, which is highly toxic. The point is sharpened by dipping the end of the wire into a solution of 4 weight percent sulfamic acid in deionized water and then anodically dissolving the wire by passing a half-wave rectified current.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15789/TN.

0240 An Electron Beam-Bunching Gun for RF Tubes: New electron-beam source provides for a new class of millimeter wave tubes

Army Materiel Development and Readiness Command,
Alexandria, VA.
Jan 84 *(B)*

An electron beam-bunching gun developed for use in a new type of RF millimeter-wave tube opens up a new class of tubes that can serve as RF power supplies or modulators, featuring simplicity, light weight, and low cost. The work was conducted by the U.S. Army Electronics Research and Development Command. The electron gun consists of a postloaded reentrant RF cavity that produces an oscillating sheet of electrons in its gap region when excited with RF energy. The electron bunch exits through an aperture at the top of the gap region at the fundamental frequency of the RF excitation, forming a unidirectional RF-current pulse. An accelerating dc plate with a constant electric-field region increases the kinetic energy of the electron bunch, which allows conversion to RF energy when the bunches are coupled to the fields of an RF output structure.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by order-

ing the NTIS report, order number: AD-A117107, price code: A02 or contact, project officer Paul Fischer (201) 544-2882.

0241 Electronic-Power-Transformer Design Guide: A compilation of information on design procedures, electrical properties, and fabrication

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(B)*

A design guide has been written to assist in the design and construction of lightweight, high-efficiency, and high-reliability space-type electronic power transformers. The design guide provides information on design procedures; magnetic and insulating-material electrical properties; and impregnating, encapsulating, and processing techniques. The specific transformers investigated had output ratings of 1.1 kV at 2,620 VA and 10 kV and 15 kV at 500 VA. Both encapsulated and nonencapsulated coil constructions were investigated. Operating frequencies up to 40 kHz were used in the designs.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: NASA-CR-134992/NAC, price: $17.50.

0242 Electronic-Power-Transformer Design Guide: A compilation of information on design procedures, electrical properties, and fabrication

National Aeronautics and Space Administration,
Washington, DC.
Sep 84 *(B)*

A design guide has been written to assist in the design and construction of lightweight, high-efficiency, and high-reliability space-type electronic power transformers. The design guide provides information on design procedures; magnetic and insulating-material electrical properties; and impregnating, encapsulating, and processing techniques. The specific transformers investigated had output ratings of 1.1 kV at 2,620 VA and 10 kV and 15 kV at 500 VA.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: NASA-CR-134992/NAC, price: $17.50.

0243 Eliminating Doppler Effects in Synthetic-Aperture Radar Optical Processors: A pair of photodetectors generates correction signals

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(B)*

An instrument detects Doppler shifts in radar data and corrects processing parameters so that ambiguities caused by the shifts are not manifested as double or overlapping images. Developed for synthetic-aperture radar, the instrument uses spatial shifts in the optical Fourier transform of a target scene to actuate servomechanisms for optical centering of images during processing.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to Paul F. McCaul, NASA Resident Office-JPL, Mail Code: 180-601, 4800 Oak Grove Drive, Pasadena, CA 91103; (213) 354-2700. Refer to NPO-14998/TN.

0244 Estimating Waveguide-Feed Directivity and Spacing: Approximate curves simplify initial steps of antenna design

National Aeronautics and Space Administration,
Washington, DC.
Jul 84 *(B, K)*

The preliminary design of a multiple-beam reflector antenna is made faster and easier by approximate formulas for the radiation patterns of standard feed elements. The formulas and the graphs plotted from them give rapid estimates of the relationship between directivity and element spacing for a given feed-element arrangement.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15603/TN.

0245 Experimental Linear Thyratron Has Been Fabricated

Department of the Air Force, Washington, DC.
Dec 84 *(B, J)*

A report has recently been released from the Aero Propulsion Laboratory at Wright-Patterson Air Force Base on long-life, high-current thyratrons for fast discharge lasers. This experimental linear thyratron, 10 cm long, has been tested as a prototype linear-scalable, low-inductance, long-life closing switch for short pulse duration parallel plate pulse modulators. Voltage holdoff to 25 kV and peak current of 2KA at 15 kV were demonstrated. The discharge plasma spread uniformly along the entire 10 cm length of the thyratron when operated with no external cathode heater power. This prototype is the first phase of a program to develop a new class of linearly scalable, low inductance thyratrons that are matched to the geometry of high current stripline pulse modulators. A number of applications, including high-power pulsed lasers and particle beam accelerators, require this type of switch. The initial testing of the linear thyratron demonstrated that thyratrons can be fabricated with a linear, low-inductance stripline geometry.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A140817/TN, price code: A03.

0246 Fabricating Slotted-Waveguide Arrays From Sheet Metal: Low-cost lightweight waveguides are formed from rolls of aluminum

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(B, G)*

In an experimental fabrication process, a microwave transmitting antenna consisting of slotted waveguides was made from aluminum sheet. When automated, the process is expected to require minimum labor and tooling. The process permits the use of thin metal to reduce raw material costs and mass. It also holds closer tolerances than are usually attained in sheet-metal work. In the fully developed process as proposed, the slotted waveguide would be fabricated from two separate aluminum sheets or foils. These form, respectively, the corrugated top sheet and the slotted bottom sheet of the waveguide. The top sheet forms three sides of the rectangular waveguide, while the bottom sheet serves as the fourth side. Microwave energy radiates through the slots in the bottom sheet.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15664/TN.

0247 Fiber-Optic Communications Cable: Ruggedized cable design meets tough optical, environmental, and mechanical standards

Army Materiel Development and Readiness Command, Alexandria, VA.

May 84 *(B, G)*

The design, material selection, and manufacturing methods are under development for a fiber-optic communications cable that can withstand high environmental stresses. The work was prepared for the U.S. Army Communications-Electronics Research and Development Command. Numerous optical, environmental, and mechanical test standards have been established for the cable design. An optical attenuation test, which is performed at six selected wavelengths, is used to assure that cables exhibit losses less than 5 dB/km. Manufacturing steps have been developed for producing the ruggedized cable, and all preliminary samples produced from the process have passed the test requirements with the exception of the low-temperature test.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-120780, price code: A06, or contact project officer John W. Strozyk (201) 544-4959.

Field Repairs of Optical-Fiber Communication Links: Fixture allows splicing with minimal skill

See 0182

0248 Flat Pulse Generator Developed

Department of Commerce, Washington, DC.

Jul 84 *(B)*

National Bureau of Standards scientists have developed a reference step-like waveform generator for characterizing accurately the step response of oscilloscopes, transient recorders, and fast sampling channels of digital measurement instruments and automatic test equipment. Reference Flat Pulse Generator (NBS-TN 1067) describes the theory, circuit design, performance specifications, modeling and computer simulations of the generator. The publication contains a complete circuit diagram and descriptions for the clock, delay and pulse duration logic, the current-switching output stages, and the regulated power supplies.

FOR ADDITIONAL INFORMATION: The publication is available for $4.50 prepaid from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Order by stock number 003-003-02527-5.

0249 Formation of Supersaturated Alloys for Semiconductor Device Applications

Department of Energy, Washington, DC.

Feb 84 *(B, J)*

Two methods have been developed that can be used to produce supersaturated alloys in ion-implanted semiconductors. Using either method, Group III and Group V dopants can be incorporated into substitutional lattice sites at concentrations that far exceed equilibrium solubility limits (by factors of up to 1000 in some cases). In the first method, radiation from a pulsed laser (typically 15 ns pulse duration time) is used to anneal the near-surface region of the ion-implanted semiconductor (laser annealing). The absorbed laser radiation leads to melting of the near-surface region, and the melted region recrystallizes from the underlying substrate by means of liquid-phase epitaxial regrowth at velocities of several meters per second. At these growth velocities the implanted Group III and Group V dopants are incorporated into substitutional lattice sites at concentrations that greatly exceed equilibrium solubility limits. In the second method, low-temperature thermal annealing (<600 C) is used to anneal the ion-implanted semiconductor by solid-phase epitaxial regrowth. Both methods are being routinely used to produce specimens for laboratory tests. Highly doped, shallow-surface layers on semiconductors are useful for formation of ohmic contacts, interconections, and p-n junctions for high-power device applications.

FOR ADDITIONAL INFORMATION: Contact: D. W. Jared, Oak Ridge National Laboratory, P.O. Box X, Oak Ridge, TN 37830; (615) 574-4192. Refer to 469/XTN. U.S. Patent 4,181,538 has been issued. Information regarding nonexclusive or limited-exclusive licensing is available from the Assistant General Counsel for Patents, Department of Energy, Washington, DC 20545.

Hiding Solar-Array Bus Bars: End terminals are mounted under the cells, maximizing the usable illuminated area

See 0337

0250 High Efficiency Motors Pay Off

Department of the Navy, Washington, DC.

Feb 84 *(B, C)*

Should the industrial user be concerned with the efficiency of electric motors. A simple calculation procedure shows that savings in electrical energy consumption often will justify the immediate replacement of a low-efficiency motor with a high-efficiency motor. An even stronger case can be made for the initial purchase of an expensive high-efficiency motor rather than a relatively cheap low-efficiency motor when a new motor is needed. The calculation procedure shows how many hours per day the motor must be used to justify the high-efficiency unit when motor costs, electrical energy costs, and motor efficiencies are known.

FOR ADDITIONAL INFORMATION: Contact: Ron Vincent, Code L62, Department of the Navy, Naval Civil Engineering Laboratory, Port Hueneme, CA 93043; (805) 982-5778.

0251 High Field Zinc Oxide Varistors

Department of Energy, Washington, DC.

Jan 84 *(B, H)*

Advanced ceramic processing techniques have been used to produce very fine-grained zinc oxide varistors. Processing steps include synthesis of highly active powders by coprecipitation or sol-gel techniques, hot pressing to achieve high density at temperatures below 800C, and heat treatment to develop fully the nonohmic electrical properties. Varistors having breakdown fields near 800 V/mm have been demonstrated; the high breakdown voltage results from a very fine ZnO grain size. Further development work is planned, along with fundamental studies of varistor behavior in these materials. High-voltage surge arrestors for power distribution systems could benefit from the size reduction inherent in this invention. Underground transmission lines are a particularly likely application because space is at a premium there. This technology could also be used to fabricate miniaturized varistors for lower-voltage circuits.

FOR ADDITIONAL INFORMATION: Contact: D. W. Jared, Oak Ridge National Laboratory, P.O. Box X, Oak Ridge, Tennessee 37830; (615) 574-4192. Refer to 471/XTN.

0252 High-Density Printed Wiring: Channel plating provides thin, closely spaced conductors

Department of Energy, Washington, DC.

Apr 84 *(B, G)*

In the channel-plating process for manufacturing printed-wiring boards, the dielectric substrate is clad with a very thin layer of copper. The printed-wiring pattern is outlined by a relatively thick layer of photoresist, and copper is electroplated in the channels created by the photoresist. The photoresist is removed, and the copper in the noncircuit area of the panel is etched away, leaving only the printed wiring. Because the noncircuit area is clad with only thin copper, only about one-fourth as much cladding needs to be removed after the plating operations are completed. With the combination of thin-clad laminate and thick photoresist, printed-wiring boards can be manufactured with lines and spacing as small as 0.127 mm.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-021687, price code: A03.

0253 High-Power Switching Transistor: Improved switching transistors handle 400-A peak currents and up to 1,200 V

National Aeronautics and Space Administration, Washington, DC.

Oct 84 *(B)*

Large-area high-voltage transistors (D7ST) have been developed for use in advanced power-switching applications. For years the transistor has been the basic building block of low-power electronics while the thyristor has been the workhorse of the electrical power industry. Several years ago, however, a new power-switching transistor, model D60T, was developed and made commercially available and has opened the door to high-power applications where transistors have previously been impractical. The new D7ST transistor is rated on the basis of sustaining voltages of 400 to 600 volts and features a gain/current product of 1,000 to 1,700 amperes.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: NASA-CR-165547/NAC, price: $10.

0254 High-Power Switching Transistor: Improved switching transistors handle 400-A peak currents and up to 1,200 V

National Aeronautics and Space Administration, Washington, DC.

Sep 84 *(B)*

Large-area high-voltage transistors (D7ST) have been developed for use in advanced power-switching applications. For years the transistor has been the basic building block of low-power electronics while the thyristor has been the workhorse of the electrical power industry. Several years ago, however, a new power-switching transistor, model D6OT, was developed and made commercially available. Since the development of the D6OT, new high-power versions (D7ST) have been developed for space power applications. The new D7ST transistor is rated on the basis of sustaining voltages of 400 to 600 volts and features a gain/current product of 1,000 to 1,700 amperes.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: N82-18506/NAC, price: $10.

0255 High-Voltage Monolithic Ceramic Capacitors: Twenty-fold reductions in size are achieved

Department of Energy, Washington, DC.

Oct 84 *(B)*

Two monolithic ceramic capacitors developed for high-voltage energy storage take up only a fraction of the volume of conventional capacitors. One unit rated at 4.0 micro F, 500 V is designed to withstand discharge current of 2,100 A; the other rated at 2.2 micro F, 750 V is designed for a minimum discharge current of 700 A. Size reduction is significant. For example, the 2.2 micro F capacitor is one twentieth of the volume of the conventional bank of five reconstituted-mica capacitors. The capacitors consist of palladium electrodes embedded in a barium titanite ceramic body fused from layers of the ceramic.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-009234/NAB, price code: A02.

0256 High-Voltage Spark-Gap Switch: Overvoltage device operates safely and reliably with high precision

Department of Energy, Washington, DC.

Mar 84 *(B)*

A gas-filled spark-gap switch employs niobium electrodes and a sleeve arrangement to improve voltage-breakdown stability. The materials in conventional switches erode too easily during operation, causing reductions in reliability and lifespan. Spark-gap devices are used for the protection of circuit components and for switching high currents from capacitors into output loads at various breakdown voltages. The switch consists of dome-shaped niobium electrodes housed in an insulating alumina cylinder. Breakdown voltage level is set by the selection of the spark gap and xenon fill-gas pressure. The device is capable of switching 1.7 kV and discharging up to 3 kA from a 0.3-micro F capacitor. Input voltage rise time can be as high as 570 V/ms, and the switch can function reliably for more than 1,000 applications.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-002381, price code: A02. For licensing information, contact: Office of Assistant General Counsel for Patents, DOE, Washington, DC 20585. For other information, contact Gordon E. Boettcher, 2566, Sandia National Laboratories, P.O. Box 5800, Albuquerque, NM 87185.

0257 Improved Connector Shell for Cable Shields: Braid is gripped around its entire circumference

National Aeronautics and Space Administration, Washington, DC.

Mar 84 *(B)*

A new cable-connector shell improves electrostatic and electromagnetic shielding by electrically connecting the cable braid around its entire circumference. The extra protection afforded by this simple improvement is needed for metal-oxide-semiconductor integrated circuits and other delicate circuits that are susceptible to damage by electrostatic discharges. Currently-available commercial connectors crimp or squeeze the cable braid but may leave gaps that can allow the entry of electrostatic and electromagnetic impulses.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15584/TN.

0258 Improved High-Current Drive Circuit: It uses a VMOS field-effect power transistor

National Aeronautics and Space Administration, Washington, DC.

Dec 84 *(B, C)*

A high-current drive circuit, such as those used for solar-panel loads, employs an n-channel enhancement-mode VMOS field-effect power transistor to eliminate the problem of oscillation at high power encountered in conventional circuits with bipolar transistors. The drive voltage required is typically 1 to 3 V for a load current of 10 A. The circuit is fast because the low input capacity of the VMOS transistor keeps the RC time constant in the low millisecond range. In addition, there are no current-storage problems such as those associated with the bipolar transistors.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-14938/TN.

0259 Improved Two-Phase Switching Regulator: The coupled-inductor polyphase regulator has better efficiency and lower inductor losses

National Aeronautics and Space Administration, Washington, DC.

Dec 84 *(B)*

An improved two-phase switching regulator employs negative coupling between the inductors to achieve a better power-to-weight ratio while reducing peak switching currents and inductor losses. Although conventional two-phase switching regulators generate significantly-lower input and output ripple compared with their single-phase counterparts, they do not improve inductor or switching-device utilization. Design equations and tables were developed and measured results were obtained for several breadboard systems. Inductor utilization was shown to improve by about 35 percent using the new technique.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for the commercial use of this invention should be addressed to Paul F. McCaul, NASA Resident Office-JPL, Mail Code: 180-601, 4800 Oak Grove Drive, Pasadena, CA 91103; (213) 354-2700. In either case refer to NPO-15172/TN.

0260 Improving Flat-Cable Manufacturing: Cable rejection rate is reduced by almost half

Department of Energy, Washington, DC.

Aug 84 *(B, G)*

Flat, flexible electrical cables have had a high rejection rate in manufacturing because of foreign particles, damage, dents, and out-of-tolerance dimensions. The materials, processes, equipment, and production facilities used in manufacture of these cables were reviewed to see what improvements could reduce the attrition rate (which has varied from 25 to 60 percent) and produce more reliable cables.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-004167/NAB, price code: A02.

0261 Inductive-storage and transfer system provides control of pulse characteristics at high power levels

Department of Energy, Washington, DC.

Feb 84 *(B, C)*

A switching circuit delivers electrical pulses from an inductive-storage device so that pulse rise time, pulse width, and pulse repetition frequency can be controlled independently. The need for these systems has grown from the advent of pulse lasers and other devices that require repetitive high-power pulses for operation. Other methods, such as plasma focus switches, electron-beam-controlled switches, and vacuum arc switches, rely on sophisticated external systems and cannot provide stable, controllable, repetitive switching. The pulse circuit consists of an inductive-storage device, an external dc power supply, a bypass switch, a trigger switch, an array of commutator switches located around a commutator capacitor, and a load switch for delivering electrical pulses directly to the load.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order numbers: PAT-APPL-341,374 and LA-UR-81-269, price code: A02. For licensing information, contact: Office of Assistant General Counsel for Patents, US DOE, Washington, DC 20585.

0262 Insulated-Metal Substrates for Hybrid Integrated Circuits: Mass-production potential is evaluated

Army Materiel Development and Readiness Command, Alexandria, VA.

Oct 84 *(B, G)*

A report presents the results of a study of technology relevant to high-volume production of thick-film hybrid electronic circuits on insulated-metal substrates. Physical, thermal, electrical, and chemical properties of commercially available porcelain-enameled steel (PES) substrates were measured and analyzed for their effect on thick-film performance. Data on thick-film conductors, dielectrics, and resistors were evaluated in the study, which was made for the Harry Diamond Laboratories. Using these data and information on fabrication techniques, the researchers built a small production line and tested it. They found that a thick-film hybrid circuit could be processed through most operations in high volume with acceptable efficiency.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A132514/NAA, price code: A06, or contact project officer Albert Lee (202) 394-2840.

0263 Linear Control System Design Analysis

Department of Energy, Washington, DC.

Sep 84 *(A, B, D)*

CLAP is a system of programs developed as a tool for the engineer to use in the design and analysis of linear controls for electronic or mechanical systems. Programs are included to calculate and plot system response time and gain and phase versus frequency, to calculate the roots of Nth-order polynomials, and to generate root locus plots as a function of loop gain. Bandwidth limitations, overshoot, ringing and other instabilities can be observed and corrected. Data files can be modified and merged. Characteristics and parameters of a system can be analyzed, then modified with a computer model of a compensator 'installed' in the feedback loop. The floating point accuracy of the computer limits the order of the transfer function polynomials to 15.

FOR ADDITIONAL INFORMATION: Contact: NTIS Computer Products Center, National Technical Information Service, Springfield, VA 22161, (703) 487-4763. Refer to DE83-048995/TN.

0264 Liquid-Impregnated Plastic-Film Capacitor: Long life, high reliability, and high energy density capacitors are obtained

Department of Energy, Washington, DC.

Oct 84 *(B)*

A new capacitor technology is being developed that uses perfluorocarbon insulating liquids to impregnate plastic-film capacitor rolls. The capacitors will be applied in high-energy, repetitive pulse-power systems for magnetic-confinement fusion, inertial-confinement fusion, ion-propulsion engines, and medical electronics. Perfluorocarbon impregnants are attractive for capacitor applications because they have extremely low surface tensions (12 dynes/cm) in combination with low-kinematic viscosities (0.4 cs). This combination results in nearly-perfect, void-free impregnation and wetting.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-006737/NAB, price code: A02. For information not provided, contact G. Howard Mauldin, Sandia National Laboratories, Division 2153, Albuquerque, NM 87185; (505) 844-4260.

0265 Low Loss Two-Signal Microwave Antenna Coupler

Department of the Navy, Washington, DC.

May 84 *(B)*

The Naval Ocean Systems Center (NOSC), San Diego, Calif., has developed a scheme for coupling two independent signals to a microwave circular array antenna by using a unique precombining phase arrangement, unique combining of signals with specific phases at each 3dB combiner, and unique postcombining phase shifting such that power from both outputs of all 3dB couplers is usable by the antenna. The present technique and apparatus delivers twice as much power to the circular array antenna as prior art methods and no cooling, space, or weight allocation is needed for a dissipative load.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer Fact Sheet, Code E411, Naval Surface Weapons Center, Dahlgren, Virginia 22448. Refer to 090105.

0266 Low Temperature Properties for Fusion Magnets Are Produced

Department of Commerce, Washington, DC.

Aug 84 *(H)*

Since 1977, the National Bureau of Standards has had a program to produce materials property data that will facilitate the design and development of cryogenic structures for superconducting magnets in fusion energy power plants and prototypes. The research covers structural alloys (especially stainless steels); weldments and castings; and nonmetallics (composites and laminates, in particular). A technology transfer program is underway involving workshops, annual reports of work accomplished, and handbook pages distributed to the industry.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB83-259630/NAC, price: $32.50.

Low-Cost Alternatives in Hybrid Microcircuit Packaging: Adhesive sealing, nickel plating, and multiwire boards are evaluated
See 0669

Low-Temperature Water Diffusion in SiO2 Thin Films: Nuclear-resonance profiling looks into the formation mechanism of IC thin films
See 0109

0267 Manufacturing Small Thermionic Devices: Circuit layers would be deposited by dc-plasma spraying

Department of Energy, Washington, DC.

Feb 84 *(B, G)*

Small, simple versions of conventional thermionic vacuum or gas-filled tubes would be fabricated by a proposed dc-plasma-spraying process. When fully automated, the process would enable many components to be deposited on substrates in what amounts to large, coarse integrated circuits containing thermionic devices. Like other thermionic devices, those fabricated by the new process can operate in high-temperature, high-radiation environments that cause solid-state components to fail. The new manufacturing process can be used to form diodes, triodes, and higher multiple-grid devices. Because a vacuum is not required until the glass-sealing step, the cost and complexity are less than in the thin-film techniques used in solid-state micro-electronics.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-002384, price code: A02. For licensing information, contact: Office of Assistant General Counsel for Patents, US DOE, Washington, DC 20585.

0268 Manufacturing Surface-Acoustic-Wave Devices: Work on an early phase of manufacturing development is described

Army Materiel Development and Readiness Command, Alexandria, VA.

Oct 84 *(B, G)*

A report reviews the manufacturing development applied to two distinct surface-acoustic-wave (SAW) devices: A 60-MHz by 60-microsecond down-chirp linearly dispersive filter operating at 200 MHz, on a lithium niobate substrate; and a two-part 100-kHz-bandwidth resonator operating at 400 MHz, on a quartz substrate. The devices employ grooved reflective arrays on the piezoelectric substrates. The reflective arrays are formed by an ion-beam etch process. The report, which was prepared for the U.S. Army Electronics Research and Development Command, covers engineering development, the first phase in achieving full-scale production capability. The specific electrical design and test results for both filter and resonator are presented.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by order-

ing the NTIS report, order number: AD-A129936/NAA, price code: A09.

Measuring Power Flow in Electric Vehicles: Instrument accommodates switching transients and common-mode voltages
See 1015

Measuring Tension in Transistor Suspensions: Vibration analysis is nondestructive and noninvasive
See 0525

Method Has Been Developed to Remove Effects of Time Jitter
See 0528

0269 Microcomputer Multiplexes Alphanumeric Labels on CRT's: External, low-power alphanumeric label generator eliminates costly video circuitry
National Aeronautics and Space Administration,
Washington, DC.
Sep 84 *(A, B, E)*

A cathode-ray-tube (CRT) control system generates and multiplexes alphanumeric characters with continuously-varying analog waveforms. Designed to display simultaneous electrocardiogram waveforms with vital sign digital displays, the system generates vertical, horizontal, and intensity control signals to the CRT and adapts to most CRT equipment. Although similar CRT displays are based on this technique, the application of an independent, low power microprocessor with simple user programing and peripheral control circuits to a CRT display control system is unique. Advantages of this control system include low power consumption, insensitivity to power-supply variations, wide adaptability, and relatively simple circuits and programing.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20079/TN.

0270 Microwave Radiation Detector: A direct photon detector responds to microwave frequencies
National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(B, K)*

A method based on trapped-ion frequency-generation standards is proposed to detect radio-frequency (RF) radiation at 40.5 GHz. The technique could be used for direct-detection (RF) communication, radar, and radio astronomy. In the new direct quantum detector, laser pumping of trapped mercury ions causes them to emit photons when irradiated with 40.5-GHz microwave energy. The photons could be detected by a photomultiplier tube and counted to assess the level of the incident microwave radiation. The structure is thus a laser-pumped direct photon detector for the 40.5-GHz radiation. The technique can be extended to other radiation frequencies by using other species of trapped ions.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15932/TN.

0271 Minimizing Vibrations While Orienting Large Structures: Control algorithm times thrustor pulses to minimize vibrations
National Aeronautics and Space Administration,
Washington, DC.
Feb 84 *(B, D)*

Structural vibrations and dynamic loads have been theoretically analyzed for their effects on the pointing and sluing of a large antenna (100 meters in diameter) deployed from the Space Shuttle at the end of a 100-m-long mast. The analysis resulted in a control algorithm that insures pointing accuracy while minimizing vibrations of the long flexible mast. The approach is applicable to terrestrial antennas or other large lightweight structures.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25439/TN.

0272 Modernized Electronic Manufacturing Facility: Fabrication and testing capabilities are described
Army Materiel Development and Readiness Command,
Alexandria, VA.
Aug 84 *(B, G)*

A report is available covering the spectrum of electronic and microelectronic capabilities of the Electronic Engineering Technology Branch of the Harry Diamond Laboratories. The report, prepared by the U.S. Army Electronics Research and Development Command, describes the five principal sections of the Branch: Computer-Aided Operations, PC Board Facility, Thick Film Facility, Assembly/Model Shop, and Component Testing Facility. The range of production capabilities extends from thick-film hybrid microelectronics and PC boards to conventional and novel electronic and electromechanical assemblies.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A119272/NAA, price code: A04, or contact project officer Dennis W. Martin (202) 394-1551.

0273 Near-Field Antenna Measurements Approximated
Department of Commerce, Washington, DC.
Jun 84 *(B)*

A new NBS publication provides electrical engineers with approximate formulas for calculating the gain and far-field pattern for open-ended rectangular waveguide probes used in making probe-corrected near-field antenna measurements. Two methods were developed, both of which significantly reduce the previous limits of uncertainty for calculated probe characteristics. Previously, the only means of adequately determining the required far-field gain and complex pattern of the probe was by direct measurement, a tedious and time consuming operation. Direct measurement still is required when the highest accuracy is sought, but calculated probe characteristics based on these new formulas can now be used for less demanding cases.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB83-233999/NAC, price: $8.50, or contact Raymon Baird, (303) 497-3301.

0274 New Program Will Analyze Microelectronic Test Data
Department of Commerce, Washington, DC.
Jul 84 *(A, B)*

The National Bureau of Standards has developed a computer program, STAT2, which can be used to analyze data from integrated circuit test structures on semiconductor wafers. The program addresses the need to analyze, summarize, and display large amounts of data acquired using automatic test equipment. STAT2 reads data into a two-dimensional array; calculates the mean, sample standard deviation and median; identifies outlying values; makes grey-tone, numerical and contour maps on an online printer; makes a numerical map on a terminal; makes a histogram on a line printer; and identifies spatial correlations between data sets contained in a database. STAT2 is written in FORTRAN for the VMS (VAX) operating system, but can be adapted to other systems.

FOR ADDITIONAL INFORMATION: Contact: Richard Mattis, B356 Technology Building, National Bureau of Standards, Washington, DC 20234.

Optical Coupler/Decoupler Communication Module: Design uses efficient, high-resolution-wavelength multiplexer
See 0186

0275 Optical-Fiber-to-Channel-Waveguide Coupler: A holding device is made by etching V-shaped grooves in silicon
National Aeronautics and Space Administration,
Washington, DC.
May 84 *(B)*

An accurate fixture couples single-mode optical fibers to LiNbO3:Ti diffused-channel waveguides. The fibers, with a core diameter of about 5 micro m, are held at 110 micro m center-to-center separation and alined with similarly-spaced channel waveguides of about 2- by 5 micro m rectangular cross section.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15555/TN.

0276 Phase Detector for Power-Factor Controller: Positive feedback assures reliable switching
National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(B)*

The three-phase power-factor motor controller includes a phase detector in each leg of the powerline. Each phase detector generates rectangular pulses that repeat at the powerline frequency and have durations approximately equal to the time lag between the line voltage and the motor current. The phase-detector output is combined with a manually- or automatically-set power-factor command voltage and compared with a line-synchronous ramp voltage. The comparator output is then used to control the thyristor that feeds power to the motor.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Division, P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100 Ext. 241. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to Leon D. Wofford, Jr., George C. Marshall Space Flight Center, Mail Code: CC01, Marshall Space Flight Center, AL 35812; (205) 453-0020. In either case refer to MFS-25854/TN.

0277 Planar-Doped Barrier Semiconductors: New classes of electronic devices are being evolved
Army Materiel Development and Readiness Command,
Alexandria, VA.
Jan 84 *(B)*

A new majority-carrier rectifying device--the planar-doped barrier (PDB)--has been developed for use in a variety of semi-conductor applications, according to a report prepared by the U.S. Army Electronics Research and Development Command. More conventional structures, such as the Schottky barrier, suffer from inherent limitations with respect to barrier heights, metallurgy, interface states, and capacitance. The basic profile of the PDB consists of an n++-i-p++-i-n++ configuration in which an extremely narrow p++-planar region is grown in an undoped region by molecular-beam epitaxy. The dominant transport mechanism is by majority-carrier thermionic emission over the barrier for both positive and negative bias. The key feature of the PDB is that the barrier height can readily be varied from zero to approximately the band gap of the semi-conductor. PDB diodes for use at millimeter frequencies can reduce local oscillator power requirements and conversion losses at significantly reduced fabrication costs. Other applications include very high-speed switches for logic gates, transistors for three-terminal application in the millimeter frequency range, and a variety of high-frequency and millimeter-wave diodes.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A117307, price code: A02 or contact project officer Thomas R. Aucoin (201)544-2452.

0278 Plastic-Sealed Hybrid Power-Circuit Package: Concept uses a plastic hermetically sealed package
National Aeronautics and Space Administration,
Washington, DC.
Jan 84 *(B)*

A proposed design for a hybrid high-voltage power-circuit package uses a molded plastic for hermetic sealing instead of a glass-to-metal seal. The new package would be used to house high-voltage regulators and solid-state switches for applications in aircraft, electric automobiles, industrial equipment, satellites, solar-cell arrays, and other equipment in extreme environments. The design could house four semiconductor chips, each 0.25 inch square, dissipating 40 watts to a heat sink. The package could operate at up to 1,000 Vdc in air or vacuum at temperatures from that of liquid nitrogen up to 500F.

FOR ADDITIONAL INFORMATION: Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to the Patent Counsel, Johnson Space Center, Mail Code: AL-3, Houston, TX 77058; (713) 483-4871. Refer to MSC-20181.

Poisoning of Semiconductors
See 0544

Polymeric Applications in Electronics: A training manual shows how to use polymeric materials in fabricating electronic components
See 0809

0279 Power Frequency Strengths of Insulation Structures: Study examines recent developments in insulation against power-frequency overvoltage
Department of Energy, Washington, DC.
Jan 84 *(B, C)*

Insulation from power-frequency over-voltage remains a major obstacle to cost reductions of high-power transformers and other high-power electrical equipment. The major problem is relatively large clearances that have to be maintained between the electrodes to prevent the insulation breakdown from power-frequency overvoltage. This problem has remained in spite of the recent reductions in insulation clearances due to improvements in lightning and switching-surge protection. A published report presents the results of recent studies on this subject. It reviews system overvoltages, insulation in oil, and insulation in SF6 gas, the three major areas of concern in power-frequency insulation. A comprehensive bibliography lists literature on liquid/particle motion.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-002754, price code: A13.

0280 Power-Factor Controller With Fast Load Response: Sudden changes in induced emf are sensed

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(B, C)*

In a refinement of the soft-starting three-phase power-factor motor controller, a few additional components enable the circuit to respond quickly to a sudden increase in motor load. The soft-start characteristic is also improved. The added circuitry senses the induced electromotive force of the motor during the nonconducting period of the thyristor in phase A. When the motor is idling and operating at a controlled low power factor, the sudden application of a large load causes this voltage to have a polarity opposite that of the line voltage in phase A. This opposite voltage is used to derive a fast-reaction control voltage to bring the motor quickly up to full power.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to Leon D. Wofford, Jr., George C. Marshall Space Flight Center, Mail Code: CC01, Marshall Space Flight Center, AL 35812; (205) 453-0020. Refer to MFS-25852/TN.

Primer is Developed for Measuring 60-Hz Fields
See 0550

0281 Printed Circuit Converts RF Energy to dc Power: An ultra-light-weight, large-area, antenna/rectifier has 85 percent conversion efficiency

National Aeronautics and Space Administration,
Washington, DC.
Feb 84 *(B, C)*

A new ultra-light-weight, low-cost, flexible 2.45-GHz-film, etched-circuit rectenna format, made from Kapton F-film, has been developed. This element allows the direct conversion of RF energy into dc electric power at an overall efficiency of 85 percent, and a mass-to-dc-power-output ratio of 0.4 kg/kW. Rectenna is a functional abbreviation of the terms rectifier and antenna that denotes a special class of receiving antennas made up of continuous receiving cells, each smaller in dimension than a wavelength and each terminated with a rectifying device.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for the commercial use of this invention should be addressed to Norman T. Musial, Lewis Research Center, Mail Code: 500-311, 21000 Brookpark Road, Cleveland, OH 44135; (216) 433-4000, Ext. 346. In either case refer to LEW-13913/TN.

0282 Processing of Synthetic-Aperture-Radar Data: Ambiguous data are combined to permit fast-transform convolution

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(J)*

Range migration in the two-dimensional ensemble of range-correlated synthetic-aperture-radar (SAR) data prevents the direct application of frequency-domain or other fast-transform convolution algorithms. The problem occurs because the successive data traces from targets at a constant slant range are not colinear. A new data processor was designed, such that the two-dimensional ensemble of range-correlated SAR data is stored in memory and extracted in a format for which the azimuth data are colinear.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15316/TN.

0283 Programable Power Conditioner: It accepts a range of inputs and produces a range of outputs

National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(B, C)*

A versatile power conditioner can be programed to handle power from a wide range of sources such as solar arrays, fuel cells, and electrochemical batteries. It can also be programed to regulate voltage over the range of 20 to 180 volts dc, maintain a constant current at any value between 0 and 100 amperes, provide impedance matching between sources and loads, and provide changing voltages and currents on the basis of sensor measurements (for battery charging, for example).

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25531/TN.

Radio-Frequency and Wideband Modulation Arraying: The summing network receives coherent signals from all the receivers in an array
See 0187

0284 Rapid Circuit Breadboarding: The cost of a one-of-a-kind circuit board would be reduced

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(B)*

One-of-a-kind circuits can be assembled quickly by using a prototyping board (Proto-board, or equivalent) in conjunction with a copper-clad circuit board that has the same hole pattern. The circuit board would be placed over the prototyping board before any electronic components or wires are inserted. After testing and verification of the circuit, the circuit board would be lifted with the components remaining in place. With a retainer placed over the components, the board would then be inverted and the components soldered in place. Thus, the need for removal and reinsertion of the electronic components is avoided.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for the commercial use of this invention should be addressed to Leon D. Wofford, Jr., George C. Marshall Space Flight Center, Mail Code: CC01, Marshall Space Flight Center, AL 35812; (205) 453-0020. Refer to MFS-25761/TN.

0285 Rare Earth/Cobalt Permanent Magnets: Magnets allow significant simplifications in circuit design

Army Materiel Development and Readiness Command,
Alexandria, VA.
Jun 84 *(H, J)*

The characteristics and use of rare earth/cobalt permanent magnets (REPM's) as flux sources was studied. The work was prepared for the U.S. Army Electronics Research and Development Command. REPM's differ from conventional magnets and offer several important advantages. They include large intrinsic moments per unit volume, extraordinarily high resistance to demagnetization by applied fields, constant values of magnetomagnetic force regardless of the configuration of the magnetic circuit in which they are used, and the possibility of simplifying field calculations by the replacement of the REPM with equivalent pole densities, current sheets, or volume dipole distributions.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A122138, price code: A02.

0286 Reducing the Resistance of Conductive-Adhesive Bonds: Current pulses lower the resistance of silver-filled epoxies

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(G, H)*

Capacitive discharge reduces the interfacial resistance between aluminum surfaces joined with silver-filled epoxy. The technique offers a noninvasive solution to the problem of attaching grounding brackets to aluminum honeycomb structures. Metal parts that are to be joined both mechanically and electrically are sometimes bonded together with silver-filled epoxy. However, when very good electrical contact is necessary, available epoxies may not have sufficiently low conductivity. Moreover, in some applications, substitute methods, such as welding or riveting, may be ruled out by constraints on weight, strength, or surface finish.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and a diagram is available by ordering the monthly subscription package, order number PB83-925710, price code E02. For licensing information, contact Marvin F. Matthews, Lyndon B. Johnson Space Center, Mail Code: AL-3, Houston, TX 77058; (713) 483-4871. Refer to MSC-20427/TN.

0287 Repairing Damaged Power-Cable Insulation: Simple method saves time, money, and material

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(B)*

Damaged insulation at bulkhead terminations of underground power cables can be repaired inexpensively while the cable remains in place. Using standard cable-splicing and cable-termination techniques, the method results in new terminations with a safety factor equal to that of any portion of the cable. In the new method, the cable remains in place while new insulation is applied to the damaged portion. Unless the conductors are damaged with pits or peaks from high arcing, the new method gives a completely satisfactory repair.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB84-925110, price code E02.

Reworking Packaged Hybrid Microelectronic Circuits: Equipment and processes have been developed for fast and economical deliddding and resealing
See 0705

Samarium Alloys for Permanent Magnets: These materials offer the potential for high-performance, lightweight magnets for electronic devices
See 0823

Scientists Develop New Millimeter Wave Noise Standard
See 0559

0288 Shielded Aluminum Flat-Conductor Cable: Thin wiring harness stores compactly

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(B, C)*

A lightweight shielded flat-conductor cable has been developed as a wiring harness for a folding solar photovoltaic array and as a transmission line for instrumentation signals. The cable is thin, allowing long lengths to be stored by folding into relatively short stacks. The cable is fabricated in a series of roll-lamination processes. Aluminum conductors are embedded in an adhesive layer between Kapton (or equivalent) polyimide insulating sheets.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB84-925211, price code E02.

Shielding Effectiveness Measuring Techniques Are Investigated
See 0826

0289 Solid-State Ballasts for Fluorescent Lamps: Major savings in lighting energy can be realized

Department of Energy, Washington, DC.
Apr 84 *(B, C)*

A report presents the results of a study to determine the energy saved by replacing standard core-coil, 60-Hz ballasts with new solid-state ballasts that operate fluorescent lamps more efficiently. Because the price of new solid-state ballasts was not established, the data were analyzed to find the cost-effective price in various applications. A study found that cleaning and refitting the fixtures with 35-W energy-efficient lamps result in the same light levels but at 11-percent reduced energy consumption. An analysis of costs has shown that the dedicated and dimmable solid-state ballasts are economically attractive.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE81-029433, price code: A04.

0290 Solid-State Crossbar Switch: It combines analog and digital circuits for multiline/multiport switching

National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(A, B)*

A bidirectional solid-state crossbar switch provides interfacing and switching for 16 X 24 coordinate ports for 16 parallel signal lines. It is intended for rapid manual-controlled or computer-controlled reconfiguration of distributed computing systems. The switch allows for the connection of any

one port, of a set of 16 ports, to any one of another set of 24 ports.
FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to Paul F. McCaul, NASA Resident Office-JPL, Mail Code: 180-601, 4800 Oak Grove Drive, Pasadena, CA 91103; (213) 354-2700. In either case refer to NPO-15066/TN.

0291 Solid-State dc Circuit Breaker: Two-terminal unit acts like a resettable delay fuse
National Aeronautics and Space Administration,
Washington, DC.
Mar 84 *(B)*
A circuit breaker with no moving parts protects direct-current (dc) loads. The current at which the circuit breaker opens (the trip current) is adjustable and so is the time delay before the breaker trips. The forward voltage drop rises from 0.6 to 1.2 V as the current rises to the trip point. The breaker is reset by turning the source power off and then back on again. The breaker uses solid-state electronic elements.
FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25172/TN.

0292 Stabilizing Fiber-Optic Transmission Lines: A voltage-controlled optical phase shifter is the key
National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(B)*
An optical phase shifter stabilizes the propagation delay of a fiber-optic transmission line by compensating for temperature and pressure effects. The technique is also applicable to phased array antenna systems and very-long-baseline interferometer distribution systems. The change in the delay is determined by sending a signal to the far end of the optical fiber, where it is reflected and sent back down the same fiber. The two signals are compared, and the detected phase error signal drives a voltage-controlled optical phase shifter to reduce the error.
FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning license for its commercial development should be addressed to Paul F. McCaul, NASA Resident Office-JPL, Mail Code: 180-601, 4800 Oak Grove Drive, Pasadena, CA 91103; (213) 354-2700. In either case refer to NPO-15036/TN.

0293 Stable Resonators for Temperature-Compensated Oscillators: SC-cut crystals offer superior stability with less sensitivity to cutting error
Army Materiel Development and Readiness Command,
Alexandria, VA.
Oct 84 *(B)*
The frequency and temperature characteristics for SC-cut temperature-compensated crystal oscillators have been determined as a function of angle of cut in a study by the U.S. Army Electronics Technology and Devices Laboratory. The optimum angles of cut, minimum frequency deviations, and maximum frequency-versus-temperature slopes were determined for three temperature ranges. The requisite angle-of-cut accuracy was found to be readily achievable with conventional cutting equipment. The results indicate that SC-cut resonators, as opposed to the usual AT-cut devices, may permit a significant improvement in the stability of temperature-compensated crystal oscillators, especially in clock applications.
FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-P001517/NAA, price code: A02.

Standards for Epoxies Used in Microelectronics: Report has significant commercial applications
See 0832

0294 Stripper for Cables of Any Cross Section: Shoulders prevent penetration any deeper than intended
National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(F)*
A new wire stripper removes the insulation from cables with noncircular cross sections, as well as circular cross sections. The cutting blade extends from its holder far enough to cut the insulation but not the wire beneath the insulation. The blade exposure is adjustable for insulating jackets of different thicknesses. To strip a wire, it is pressed against the projecting edge of the blade and rotated to score the insulation, which can then be slid off. The shoulders of the blade-holder support the cable and prevent penetration any deeper than intended.
FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15631/TN.

Superconducting High-Magnetic Field Lab Pays Off
See 0567

Superconducting Wire With Improved Strain Tolerance: Winding stresses have a less adverse effect on current-carrying capacity
See 0992

0295 Superefficient VAR Controller: A superconducting coil controls reactive power with minimal loss
Department of Energy, Washington, DC.
Oct 84 *(B)*
A circuit controls the phase of ac powerlines with high efficiency to yield essentially zero reactive volt-amperes. The high efficiency of the circuit results from the use of a dc superconducting coil as the inductive element. The circuit can control 40 MVAR with a loss of less than 50 W. The new circuit employs an asymmetrical Graetz bridge of silicon-controlled rectifiers, the firing angles of which are controlled to vary the dc voltage on the coil so that the direct current in the coil remains constant. The circuit can be constructed for single-phase or multi-phase powerlines.
FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,348,630, which is available from: Commissioner of Patents, Washington, DC 20231, for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For additional information, contact the inventor: Heinrich J. Boenig, CTR-9, MS D464, Los Alamos National Laboratory, P.O. Box 1663, Los Alamos, NM 87545; (505) 667-4404.

0296 Suppression of Dielectric Breakdown of Insulators at High Temperatures
Department of Energy, Washington, DC.
Jul 84 *(C, H)*

All ceramic oxides used as electrical insulators at elevated temperatures suffer some form of dielectric breakdown in a sufficiently strong field or after a sufficiently long time. Single crystals of magnesium oxide (a common refractory insulator) can be made more resistant to dielectric breakdown when they are doped with copper, cobalt, or hydrogen. The presence of 30 ppm of copper impurity prolongs the lifetime of the material by a factor of 20. This benefit is expected to be extended to other materials. The effects of these impurities and their concentrations in suppressing dielectric breakdown in magnesium oxide at high temperatures have been demonstrated and evaluated in laboratory tests.

FOR ADDITIONAL INFORMATION: Contact: Office of Technology Applications, Oak Ridge National Lab., P.O. Box Y, Oak Ridge, Tennessee 37831; (615) 574-4192. Request support package 479/X/TN.

0297 Surface-Acoustic-Wave Frequency Synthesizer: Synthesizer will operate in the 1,296-to 1,533-MHz frequency range with 3-MHz step size

Army Materiel Development and Readiness Command,
Alexandria, VA.
Feb 84 *(B)*

The second of a two-part program is underway for the development of surface-acoustic-wave (SAW) technology for the U.S. Army Electronics Research and Development Command. In the first part, SAW oscillators were developed to be incorporated in a microwave frequency synthesizer for the second part of the program. The use of SAW devices improves switching speed, step size, total achievable bandwidth, and the stability of synthesizers at reduced size, weight, and power consumption (5 W). The synthesizer consists of three functional modules: the tone generation module, the synthesizer module, and the output module.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A086336, price code: A03, or contact project officer Thomas Aucoin (201) 544-2452.

Test Pattern for IC's: Random-fault densities are measured in an array of standard structures
See 0570

0298 Ti/Pd/Cu Contacts for Semiconductor Devices: Copper systems are equivalent in performance to silver or gold systems

National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(B)*

Titanium/palladium/copper contacts for semiconductor devices perform as well as the more expensive silver and gold systems now used. A 300-A titanium layer and a 200-A palladium layer are deposited on the semiconductor device by electron-beam evaporation. The desired contact pattern is etched using photoresist. A thin layer of copper is plated on the contact pattern from a cyanide solution. The copper layer is then built up to 4 to 8 microns by electroplating from an acid solution.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15043/TN.

0299 Turning-On Millimeter-Wave Devices with Thyratrons: With suitable provisions in packaging and circuitry, thyratron voltage rises very rapidly

Army Materiel Development and Readiness Command,
Alexandria, VA.
May 84 *(B)*

An investigation was conducted of the feasibility of using thyratrons for turning-on millimeter-wave devices. The investigation, which was conducted for the U.S. Army Electronics Research and Development Command, found that thyratrons can turn on suitably fast (in 1 ns) for the application, with a voltage rise of 6 kV/ns across a purely capacitive load of 60 pF. Use of ferrite-bead saturable reactors in the thyratron circuit allows the fast voltage buildup at a thyratron pressure low enough to be compatible with both reliable voltage hold-off and the high pulse repetition rate of 20 kHz. To further aid the fast voltage rise, the thyratron package was redesigned for extremely low inductance.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A114046, price code: A03 or contact project officer Calvin Bates (201) 544-5662.

Uncooled IR Detector: Detector combines a liquid-crystal film with a light-sensitive solid-state array
See 0581

Universal Pin Electronics Tester: Improved performance and reliability are obtained at reduced cost
See 0582

VLSI Unit for Two-Dimensional Convolutions: Proposed chip could be used for a variety of functions
See 0223

Wire Tester: Detects breaks, changes in cross section, and embedded foreign material
See 0586

X-Ray Inspection of Transistors: A component holder speeds examination of matched pairs
See 0590

ENERGY

Advanced System for Process Engineering
See 0086

0300 Alcohol/Petroleum Fuels for Diesel Engines: Blends of methanol, ethanol, water, and diesel fuels were formulated and evaluated

Department of Energy, Washington, DC.
Jun 84 *(C)*

Diesel fuels can be extended with methanol or ethanol for use in conventional diesel engines. A stabilizer is required to prevent a phase separation of the mixtures resulting from the presence of water. The purpose of this study was to investigate liquid-fuel alternatives for reducing the demand on petroleum resources and for providing adequate fuel supplies during an emergency. Performance tests were run on these fuels using three types of single-cylinder engines and a commercial turbocharged multi-cylinder engine.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-020752, price code: A11. For information not in the report, contact Ralph

D. Fleming, U.S. Department of Energy, CE-131.2, Washington, DC 20585; (202) 252-8055.

Algorithm Developed For Best HVAC Start/top Times
See 0069

Analysis of Short-Rotation Forests: Economic strategies are evaluated
See 0892

Analytical Methods for Synfuel Production: Techniques sometimes produce differing results from laboratory-to-laboratory
See 0087

Analyzing Resource Recovery From Waste: The economics of conventional landfill disposal can be compared with the economics for material and energy recovery
See 0383

0301 Annealing Solar Cells With Lasers: Large-area process removes ion damage
National Aeronautics and Space Administration,
Washington, DC.
Mar 84 *(C, H, J)*

A laser can anneal silicon solar cells rapidly enough for use in production, according to a recent study. The laser is a frequency-doubled neodymium: yttrium-aluminum-garnet (Nd:YAG) device. The 30-m-diameter spot formed by the laser covers enough area to process silicon wafers rapidly. The laser is intended for use on solar cells in which pn junctions have been formed by ion implantation - a technique that is likely to replace the standard thermal-diffusion method of forming junctions in cells because of its high automation potential.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15694/TN.

Aquifer Thermal-Energy Storage: A guide tells how to design and evaluate aquifer thermal-energy storage systems
See 0893

0302 Army Publishes Cold Weather Fuel Guide
Army Materiel Development and Readiness Command,
Alexandria, VA.
Feb 84 *(C, D, K)*

A new guide has been published by the Army's Belvoir R&D Center. The Field Blending Guide for Improving the Low Temperature Properties of Automotive Diesel Fuels contains information about alternative fuels that can be blended with diesel fuel to improve its low temperature performance. In addition, the guide describes a simple test to determine the cloud point of fuel sampled from a vehicle or storage tank that can be done with materials readily available in the field. The test is very simple. Once the cloud point of the fuel sample is determined, the charts included in the guide will indicate how much blending component is needed to lower the cloud point to the required temperature.

FOR ADDITIONAL INFORMATION: Contact: U.S. Army Belvoir R&D Center, Attn: DRDME-VF, Fort Belvoir, Virginia 22060.

0303 Assessing Landfill Gas Recovery Projects: Factors are provided for determining technical and economic feasibility of existing landfills
Department of Energy, Washington, DC.
Feb 84 *(C, D)*

A workbook is available for estimating production and revenue potentials for landfill gas recovery at a given site. Technical information is supplied on system options, and basic economic information is provided for assessing these options and making a preliminary judgment on feasibility of the gas recovery projects. Calculations for preliminary evaluation shown in the workbook involve not only the refuse composition, its age, and annual rainfall on the landfill but also the end use of the landfill gas.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-002319, price code: A03. For information not in the report, contact Donald K. Walter, U.S. Department of Energy, CE-323, Washington, DC 20585; (202) 252-6104.

Assessment of Landfill Methane Recovery: An assessment of the pros and cons and an annotated bibliography provide information on this untapped energy source
See 0386

Battery Grid for Submarines May Have Industrial Uses
See 0748

0304 The Benefits of Thermal-Energy Storage: Residential sector using this technology may save an estimated 80 million barrels (12.7 x 10(6) m(3)) of oil annually by the year 2000
Department of Energy, Washington, DC.
Mar 84 *(C)*

A review of the customer-side-of-the-meter thermal-energy-storage (TES) systems examines various issues this technology will face before it is introduced to the domestic residential market. The major emphasis of this report is on the potential benefits the residential sector may realize if it adopts this technology. There are three TES candidates for a near-term commercialization: (1) electric-storage heating, (2) storage water heating, and (3) storage air-conditioning. All three store electric energy in the form of heat.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DOE/CS-0195, price code: A05.

0305 Bricks and Cans for Thermal Storage: Water-filled cans and bricks provide efficient thermal storage for solar space and hot-water heating
National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(C)*

Water-filled cans and bricks containing voids of various sizes may be superior to rocks as the heat-storage medium in a solar-energy storage tank. Tests were conducted to determine the effect of size and stacking orientation of standard 10-hole bricks and water-filled soup cans on heat storage, heat transfer, and pressure drop in a water-filled thermal storage bed. The test results indicate that these thermal storage mediums are suitable for use in both passive and active solar heating systems.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25625/TN.

0306 Calcium-Free Asbestos for Fuel Cells: An organic-acid salt removes unwanted calcium without weakening the asbestos

National Aeronautics and Space Administration,
Washington, DC.
Aug 84 *(C, J)*

A new treatment removes calcium, but not magnesium, from the asbestos matrix in fuel cells. For long life, the matrix should be calcium-free. However, fuel-cell-grade asbestos contains substantial amounts of calcium as calcium carbonate. In a new treatment, asbestos is mixed with disodium ethylene diamine tetraacetic acid (disodium EDTA) in water and agitated for about 2 hours. After the disodium EDTA solution is drained away, the asbestos contains only 0.02 to 0.1 percent calcium. The fiber structure of the asbestos is unaffected.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for the commercial use of this invention should be addressed to Marvin F. Matthews, Lyndon B. Johnson Space Center, Mail Code: AL-3, Houston, TX 77058; (713) 483-4871. In either case refer to MSC-20207/TN.

0307 Carbonate Fuel-Cell Cathode: Method for preparing porous cathode provides structural integrity and improved performance

Department of Energy, Washington, DC.
Mar 84 *(C)*

Nickel oxide cathodes are prepared for molten carbonate fuel cells by a sequential sintering and lithiation process. Sintering imparts the necessary porosity and mechanical strength, while the infusion of lithium enhances the electrical conductivity. The improved method consists of preparing the porous plaque of nickel oxide first, then exposing the plaque to molten lithium salt for lithiation.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-002374, price code: A02. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. DOE, Washington, DC 20585.

Catalyst for Hydrogenation of CO: An improved catalyst reduces the costs of separating olefins from paraffins
See 0089

Catalysts for Lithium/Thionyl Chloride Cells: Organic compounds of iron or cobalt improve voltage and capacity of electrochemical cells
See 0090

0308 Cathode Corrosion in Lithium/ulfuryl Chloride Batteries: Causes and cures of short shelf life are examined

Army Materiel Development and Readiness Command,
Alexandria, VA.
Feb 84 *(B, C)*

A report details an investigation of corrosion in active-electrolyte lithium/sulfuryl chloride batteries. Such corrosion could cause short shelf life for the batteries. The investigation, which was conducted for the U.S. Army Electronics Research and Development Command, measured the rates of corrosion of lithium and sulfuryl chloride in cells and in sealed capsules by microcalorimetry. It estimated the thickness of film formed on lithium by complex-plane impedance measurements. The investigation found that the corrosion rate of lithium is lower in electrolytes prepared from purified SO2Cl2.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A116381, price code: A04, or contact project officer Alfred Legath (201) 544-4246.

0309 Ceramic Solar Receiver: Matrix concept offers efficient heat transfer at high temperatures

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(C)*

A proposed solar receiver would use a ceramic honeycomb matrix to absorb heat from the Sun and transfer it to a working fluid at temperatures of 1,095 to 1,650 C. The receiver could drive a gas-turbine engine or provide heat for industrial processes. Solar radiation from a concentrator would enter the receiver through a fused-silica dome and impinge on the ceramic matrix. The gaseous working fluid would enter the receiver through a sealed joint, cool the fused-silica dome, and flow through the matrix, which transfers heat to the gas. The heated gas would leave the receiver through another sealed joint.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15769/TN.

0310 Ceramics for Solar Receivers: Materials for high-temperature use are reviewed

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(C, H)*

A report discusses the characteristics of ceramics and assesses the potential of candidate materials in solar receivers. Design requirements are presented, including those for a receiver with fluid exit temperatures up to 1,425 C. Structural ceramics are being considered for solar applications because of their high-temperature capability, availability, and low cost. Ceramics that are of potential interest for solar receivers may be classified into three major categories: oxides, aluminosilicates, and the carbide and nitride families. Each category is discussed, and the ceramics are compared in a table.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15763/TN.

Chemical Feedstocks From Coal: Ethylene and other hydrocarbons are produced from an economically feasible process
See 0091

Coaxial Pipe for Liquid Natural Gas: System provides ultrareliable protection against leaks
See 0604

0311 Colloidal Liquid Fuel: Heavy petroleum fractions are extended with coal particles to form a pumpable fuel

Department of Energy, Washington, DC.
Jul 84 *(C, D)*

A process for mixing heavy, high-boiling-point petroleum fractions with coal produces a stable colloidal suspension.

The mixture is suitable for use as a combustion fuel, in steam engines for marine propulsion or in utility power boilers, and as a feedstock for refinery or coke production operations. The process offers economic advantage over other liquefaction methods by using shorter contact times and smaller process equipment. The process consists of grinding the coal to 100 to 2,000 micro m in size and mixing it with the petroleum fraction to form a slurry.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DOE/ER/10062-TI/NAB, price code: A06. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For other information, contact James R. Longanbach, Battelle Columbus Laboratories, 505 King Avenue, Columbus, OH 43201; (614) 424-7959.

0312 Combined Retort and Combustor for Oil Shale: Continuous fluidized-bed process extracts both fuel and heat

Department of Energy, Washington, DC.
Sep 84 *(C, D)*

A fluidized-bed retort and combustor extract gaseous and liquid fuels from oil shale, using combustible materials in the shale to provide energy for the process. The fluidized-bed apparatus moves shale continuously from a retort chamber to a combustion chamber and ensures thorough mixing of process gases with the shale.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PAT-APPL-6,368,197/NAB, price code: A02. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For further information, contact John E. Notestein, U.S. Department of Energy, P.O. Box 880, Morgantown, WV 26505.

0313 Compressible Flow About Wind Turbine Blades: Program solves the three-dimensional potential equation for flow through an arbitrary rotor

National Aeronautics and Space Administration, Washington, DC.
Mar 84 *(A, D)*

WIND numerically solves the exact, full-potential equation for three-dimensional, steady, inviscid flow through an isolated wind-turbine rotor. The program automatically generates a three-dimensional, boundary-conforming grid and iteratively solves the full-potential equation while fully accounting for the rotating and Coriolis effects. WIND is capable of numerically analyzing the flow field about a given blade shape of the horizontal-axis wind turbine. WIND is written in FORTRAN IV for batch execution.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to LEW-13740.

Computer Energy Time Unit Devised
See 0459

Conserving Energy in Scrap Iron and Steel Facilities: Energy costs can be reduced by 20 or more percent
See 0756

0314 Conserving Energy In the Iron and Steel Industry: An analysis of energy and materials flows shows opportunities and obstacles to energy conservation

Department of Energy, Washington, DC.
Dec 84 *(C, G)*

A comprehensive report reviewing energy and materials flows in the iron and steel industry examines the existing and future processes, market trends, and most of all, opportunities this industry has in energy consumption. Of the set of conservation technologies identified, most are judged to be ready for commercialization if and when the capital formation and profitability problems of the industry are solved and the gradual predicted increase in energy prices reduces the payback periods to acceptable levels.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-017530/NAB, price code: A06. For information not in the report, contact: Alan W. Wolsky, Argonne National Laboratory, Building 362, EES, Argonne, IL 60439; (312) 972-3783.

Corrosion Inhibitor for Multiple-Metal Cooling Systems: Silicate/nitrite/borate formulation is compatible with aluminum, steel, copper, and other metals
See 0758

Corrosion-Prevention for Steel Stovepipes: Several materials were found to extend the service life significantly
See 0759

0315 Costs of Batteries for Photovoltaic Power Systems: Installed and life-cycle costs for several technologies and applications are evaluated

Department of Energy, Washington, DC.
May 84 *(B, C)*

A study has estimated the installed and life-cycle costs of a number of battery technologies in a range of photovoltaic application types and sizes. The study was based on realistic scenarios for the installation and 20-year operation of battery subsystems. Cost estimates for each scenario were expressed in fixed dollars, dollars per kilowatt, and dollars per kilowatthour to allow system designers to project costs for system sizes that are in between the sizes considered.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-003849, price code: A20.

Criteria Has Been Established For Solar Heating And Cooling
See 0072

0316 Data On Natural And Synthetic Gas Mixtures Is Compiled

Department of Commerce, Washington, DC.
Feb 84 *(C, J)*

With adequate data on thermophysical properties of mixtures essential to efficient operation and design of gas plants, the National Bureau of Standards (NBS) has evaluated major literature and databases of natural and synthetic gas properties. Based on the evaluation, which was sponsored by the Gas Research Institute, NBS made recommendations for needed measurements in light of the present and future needs of the gas industry. A report, Evaluation of Natural and Synthetic Gas Mixtures, includes 543 citations covering He, H2, C1-C5 alkanes, N2, CO, CO2, NH3, H2S, H2O, CS2, COS, HCN, NOx, and SOx. It also lists the specific binary systems where liquid-vapor equilibria measurements are needed, along with the temperature and pressure ranges that need coverage.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB83-259850, price: $17.50.

Daylighting Can Cut Energy Use
See 0073

Desulfurizing Coal by Chlorinolysis and Hydrogenation: A two-process combination removes more sulfur than either process alone
See 0391

Detecting Methane Leaks: A remote sensor uses laser radiation backscattered from natural targets
See 0462

0317 Detecting Solar-Cell Failures: Circuit identifies a malfunctioning photovoltaic array
National Aeronautics and Space Administration, Washington, DC.
Oct 84 *(B, C, K)*

A logic circuit detects the failure of one solar cell out of a large array of cells in a residential photovoltaic installation. The circuit indicates that there is a failure somewhere in the array, not which cell has failed. The circuit monitors the normal operation of a photovoltaic array by comparing the voltage supplied to a load by the array to that supplied by a reference photocell. If any one of the cells fails, a comparator energizes a light-emitting diode. To identify the defective cell, the homeowner photographs the array using infrared film in a 35-mm camera. A shorted cell appears on the film as a bright spot on a comparatively dark background.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15741/TN.

Detecting Solar-Cell Failures: Circuit identifies a malfunctioning photovoltaic array
See 0463

Determining Solar-Cell Operating Temperature: A laboratory test measures the effect of windspeed and wind direction
See 0465

0318 Developing Standards for Photovoltaic Devices: Ground rules are outlined for evaluating photovoltaic technology
National Aeronautics and Space Administration, Washington, DC.
Aug 84 *(C)*

Guidelines for developing performance criteria and test standards for photovoltaic devices and systems are described. Differences in terminology, testing methods, reporting conditions, and expectations of performance and reliability have begun to hinder the research and development of photovoltaic technology. In response to these difficulties, the methods and criteria suggested in a report are intended to facilitate standardization for the benefit of designers, distributors, builders, and users of photovoltaic devices and systems. Examples of issues addressed by the interim performance-criteria document include the following: terminology -- definitions for such terms as 'array', 'panel', and 'module'; cell-contact metalization integrity -- the mechanical strength of connections under stress; and module thermal characterization -- the effect of temperature on cell performance.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15734/TN.

Developing Standards for Photovoltaic Devices: Ground rules are outlined for evaluating photovoltaic technology
See 0468

0319 Dewatering Peat With Activated Carbon: A proposed process should produce enough gas and carbon to sustain itself
National Aeronautics and Space Administration, Washington, DC.
Dec 84 *(C, D)*

Because the moisture in peat is held as a collodial suspension and by hydrogen bonding, peat cannot be dewatered by conventional solid/liquid separation techniques alone. In a proposed process, a peat slurry would be dewatered to approximately 40 percent moisture content by mixing the slurry with activated carbon and then filtering with solid/liquid separation techniques. The activated carbon breaks the colloidal suspension, reduces the surface tension between the peat and water, and aids filtering. The process would produce, in a calciner, enough low-Btu gas to sustain itself and also produce the activated carbon from the peat.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15113/TN.

Draining Methane From Coal Mines: Removing gas before coal is mined speeds up production
See 0904

Drill-Pipe Severing Tool for Geothermal Wells: Explosive device is compatible with high borehole temperatures
See 0905

Drying Wood With the Sun: Booklet shows how to build a solar-heated firewood dryer
See 0770

Dynamic Simulation of Chemical Processes: A variety of software packages are evaluated
See 0393

0320 Earth as a Residential Heat-Storage Medium: Heat is stored during hot months for use during cold months
Department of Energy, Washington, DC.
Nov 84 *(C)*

A system for residential heat storage adds heat to the earth below a house during the summer and fall and extracts it during the winter and spring. The storage system is intended for use with a rooftop solar-energy collector and a heat pump. A 3,000-gal tank is buried below the house with about 4 ft of fill over it. In the summer and fall, energy from the solar collector is stored as heated water in the tank. The heat from the tank gradually spreads into the surrounding earth. In the winter, heat is withdrawn from the tank by the heat pump to heat the house.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,361,135, which is available from: Commissioner of Patents, Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For further information, contact: Dr. Philip D. Metz, Brookhaven National Laboratory, Building 120, Upton, NY 11973; (516) 282-4091.

0321 Edge Supports for Photovoltaic Modules: Mounting strips are patterned after glazing gaskets
National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(C, D)*

New, easy-to-install supports for roof-top solar modules consist of extruded rubber mullions with locking zippers. The supports can be cut to length with a utility knife and installed without special tools. They are adaptable to many different roof configurations. The scheme allows thermal expansion and convective cooling of the modules.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15740/TN.

0322 Effects of Outdoor Soiling on Photovoltaic Modules: Airborne contaminants degrade module performances
National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(C)*

A report describes experiments to understand the effects of airborne contaminants on the sensitive surfaces of photovoltaic modules. Comparative electrical and optical performance data at field-test sites throughout the United States were collected and examined. The results show significant time and site dependence. During periods when natural removal processes, especially rain, do not dominate, the rate of particulate contamination appears to be largely material-independent. Glass and acrylic top-cover materials retain fewer particles than does silicone rubber. Side-by-side long-duration outdoor testing is the most effective way of evaluating soiling differences between materials.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15186/TN.

Electric Motors and Energy Consumptions: Cost of energy-efficient motors found to be greater than the savings that would result from their operation
See 0238

Energy and Air Quality: Handbook aids in planning the growth of energy facilities
See 0394

Energy and Solid/Hazardous Waste: Data are presented on wastes from a variety of energy technologies
See 0395

Energy and Water Resources: Data on uses, problems, and regulations are presented
See 0907

0323 Energy Conservation in the Meat Industry: Ten case histories
Department of Energy, Washington, DC.
Oct 84 *(C)*

A report presents case histories for 10 energy-efficient technologies that have been implemented by the meat industry. Basic information is provided about how the technology works, the new equipment needed, and the plant modifications required to adopt the technology. Energy-cost savings are reported, and the secondary benefits of the technology, such as increased production capacity and improved product, are described..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-018830/NAB, price code: A05. For information not in the report, contact William Sonnett, U.S. Department of Energy, Conservation and Renewable Energy, Office of Industrial Programs, 1000 Independence Avenue, SW, Washington, DC 20585; (202) 252-2389.

0324 Energy Conservation in the Textile Industry: Case histories show how energy costs can be reduced and fossil fuels conserved
Department of Energy, Washington, DC.
May 84 *(C)*

A report presents case studies of 10 energy-saving technologies implemented by the textile industry. The technologies are representative of a wide variety of technologies implemented by the industry and are applicable to most types of textile plants. Some of the technologies resulted in an immediate reduction in plant energy requirements; others have saved energy by reducing or eliminating the dependence on fossil fuels. All the technologies have had ancillary benefits ranging from reduced water usage to improved process efficiency.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-018831, price code: A05.

Energy Integrated Farm System: Mathis Farm and Georgia Institute of Technology
See 0023

Energy Technologies and the Environment: A Handbook: The effects of key technologies over the next 20 years are examined
See 0396

Enthalpy of Coal Fluids: Thermodynamic model aids in simulation of synthetic fuel processes
See 0098

0325 Environment and Small-Scale Hydroelectric Development
Department of Energy, Washington, DC.
Feb 84 *(C)*

Small-scale hydroelectric projects (<30 MW) provide a means of addressing the electrical energy demands of the United States while reducing our dependence on foreign oil. Potential sites for development of small-scale hydroelectric projects are widely distributed and include both new dams and the retrofit of existing dams to produce electricity. However, developing this renewable energy resource is not without potential environmental impacts. The purpose of a study was to analyze available literature on the most commonly raised environmental issues in hydroelectric development (dredging, upstream fish passage, water level fluctuations, turbine-passage mortality, instream flow needs, dissolved oxygen concentrations in the tail-waters, and downstream fish passage) and to provide recommendations for dealing with these issues at specific sites. The results will be useful to public and private hydro-power developers who are faced with the legal requirement to evaluate the potential environmental impacts of their projects.

FOR ADDITIONAL INFORMATION: Contact: D. W. Jared, Oak Ridge National Laboratory, P.O. Box X, Oak Ridge, TN 37830; (615) 574-4192.

Environmental Data on Energy Technologies: Handbook shows environmental data for major energy technologies
See 0397

0326 Estimating the Solubility of Gases in Battery Electrolytes: The estimates are in excellent agreement with experimental values
National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(C, J)*

A simple method is proposed for estimating the solubility of gases in electrolytes of lithium batteries, using expressions for the energy of vaporization and for the molar volume. An equation derived from solution theory relates the mole fraction of a gas in a solution to the mole fraction of the solvent, the average partial molar volumes, and the solubility parameters. The method gives estimates that are in excellent agreement with experimental values when applied to nonpolar gases dissolved in nonassociated liquid electrolytes, such as SOCl2, SO2Cl2, POCl3, 2MTHF, and propylene carbonate.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15610/TN.

0327 Evaluating Lithium Sulfuryl Chloride Batteries: With development and selection of suitable materials, practical high-energy-density batteries can be built
Army Materiel Development and Readiness Command,
Alexandria, VA.
Oct 84 *(C)*

A program examines the viability of an active-electrolyte, lithium/sulfuryl chloride battery system. Specific objectives were to quantify the stability of lithium in sulfuryl chloride solution, explore means of stabilization, and establish the performance limits of carbon/polytetrafluoroethylene electrodes. In the program, which was carried out for the U.S. Army Electronics Research and Development Command, the cell was optimized with respect to electrolyte composition and stabilizing coating. The performance of both electrodes was determined as a function of electrode and electrolyte composition, current density, and temperature. The density and conductivity of the sulfuryl chloride electrolyte were measured. The cells can deliver close to 110 percent of rated capacity at current densities up to 100 mA/sq cm. Lithium/sulfuryl chloride appears to be a viable system. However, problems with compatibility of materials must be solved.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A129564/NAA, price code: A08.

0328 Extracting Oil From Tar Sands: Oil can be extracted using solar energy
National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(C, D)*

The recovery of oil from tar sands is possible by a batch process, using steam produced by a solar heater. In the extraction process, a solar heater provides steam for heating a solvent boiler. The boiling solvent removes the oil from the tar sands in a Soxhlet extractor. Because the solar heater is off during the night, the Soxhlet extractor can be emptied and recharged for the next day.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15760/TN.

Fast Electronic Solar-Cell Tester: Microcomputer-controlled system gathers current and voltage data
See 0483

0329 Figuring Residential Energy With Pocket Calculator: Consumption for heating and cooling can be calculated quickly and easily
Department of Energy, Washington, DC.
Jan 84 *(C, D)*

A two-volume manual and five magnetic program cards offer the users of the Texas Instruments TI-59 programmable calculator an effective tool to evaluate annual energy requirements of residential buildings. Once the input data have been developed, the time required to enter the data have been developed, the time required to enter the data and compute the annual energy requirements is approximately 20 min. The program uses the variable-base degree-day technique, in which annual heating-energy consumption is computed from an established equation. A similar equation is used to compute cooling-energy consumption. Volume 1 contains the step-by-step procedure for obtaining and entering the data on input sheets. Volume II contains a brief description of the underlying theory, a listing of the entire program, and weather data.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order numbers: (Vol 1) DE82-020274 and (Vol 2) DE82-020275, price codes: A07 and A11.

0330 Flash Degasser for Geothermal Fluid: Energy-conversion efficiency is increased for geothermal powerplants
Department of Energy, Washington, DC.
Jul 84 *(C, D)*

An improved degassing system removes most of the noncondensable gases (CO2, H2S, N2, and CH4) that emerge from solution in geothermal fluid and interfere with powerplant operation. The pressure drop is lower than in earlier degassing systems, and the heat loss is lower because brine and heat removed during the degassing step are returned to the process stream. The degasser operates in conjunction with a direct-contact binary-fluid heat exchanger that uses isobutane as the working fluid for the turbine.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,346,560, which is available from: Commissioner of Patents, Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

Flexible Vinyl Strip Doors Decrease Heat Loss
See 0074

0331 Fracture Strength of Silicon Solar Cells: Tests during processing show the way to reduce breakage and increase yield
National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(C, K)*

A four-point twisting test has been developed as a standard test for determining the strength of silicon solar cells. The test is used to study cell cracking and changes in fracture strength at various process steps as a blank silicon wafer is converted to a finished photovoltaic cell. The test is helping to develop reliable information on the nature and source of flaws that cause cell fracture -- information that will lead to improved processing methods and ultimately to higher production yields and lower costs. The four-point twisting method was selected after a comparison with two other methods: cylindrical bending and biaxial flexure. Measurements with the new test have shown that strength is decreased by exterior flaws (at the edge and on the surface of a wafer) created during wafer sawing or handling.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15187/TN.

Freeze/Thaw Properties of Cellular Glass: Without moisture, temperature cycles do no harm

See 0783

0332 Fuel-Cell Reactant-Gas Purifier: A catalytic purifier removes oxygen from hydrogen feedlines just upstream of a fuel-cell stack

National Aeronautics and Space Administration,
Washington, DC.
Mar 84 *(D, J)*

A purifier catalytically removes small quantities of oxygen from a hydrogen stream before the gas enters a fuel cell. The purifier is needed because contaminant gases in the fuel-cell feedlines may affect cell performance and possibly cause a failure. The purifier consists of a layer of platinum sandwiched between two sheets of porous polytetrafluoroethylene (PTFE). The porous PTFE serves three purposes: it physically contains platinum particles, it provides a diffusion path for the passage of reactant gases to the catalyst and a pathway for product water back to the gas stream, and it creates a hydrophobic surface at the gas/PTFE interface to prevent the formation of a water film on the platinum.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB83-925403, price code E02.

Fuel-Saving Oil Burners for Homes: Two approaches to improving the efficiency of furnaces and adapting them to lower heat demands are described

See 0641

0333 Geothermal Power Turbine: Velocity-pump reaction turbine is capable of up to 70 percent energy conversion

Department of Energy, Washington, DC.
Feb 84 *(C, F)*

A low-cost recovery system produces mechanical work for power generation from geothermal energy sources. Conventional turbines require high-temperature fluid sources and operate by separating the steam and liquid phases. This system operates with fluids at low-to-medium temperatures, mainly in the liquid phase, without phase separation. Hot fluid at or above its saturation pressure enters through an inlet in the inner rotor and flows radially outward. Exiting through inner nozzles, the fluid enters an annular space leading to the exhaust nozzles of the outer rotor. Expanding through the outer nozzles, the fluid imparts thrust to the outer rotor, which mechanically drives the inner rotor in the same direction but at a reduced speed.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,332,520, which is available from: Commissioner of Patents Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. DOE, Washington, DC 20585.

0334 Glass for Solar Concentrators: A survey evaluates engineering parameters of commercial glasses

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(C)*

A report identifies four commercially available glasses as promising reflectors for solar concentrators. They have properties of high reflectance (80 to 96 percent), lower cost than first-surface silver metalization, and resistance to environmental forces. The four superior glasses mentioned in the report include two fusion glasses, one sheet glass and one float glass. Anodized aluminum surfaces are also possible candidates for solar concentrators.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-14923/TN.

Guide to Calibrating Temperature Devices is Available

See 0490

0335 Heating Greenhouses With Waste Heated Water: Industrial-waste heated water reduces greenhouse energy costs

Department of Energy, Washington, DC.
Apr 84 *(C)*

The surface heating of greenhouses with industrial-waste heated water is an effective way of reducing operating costs. Tests conducted on a 9- by 13-m greenhouse, using cooling water coming out of the Illinois Power Company Baldwin plant, have demonstrated a savings of 33 percent in conventional heat. For commercial greenhouses this energy-cost savings is expected to reach 67 percent. The technique of surface heating the greenhouses with the waste water is relatively simple. The abundance of waste heated water makes this method particularly attractive. For example, waste water from an 1,800-MW power plant can heat 200 acres of greenhouses.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DOE/RS/10107-T1, price code: A02. For information not provided, contact Dr. Paul N. Walker, Department of Agricultural Engineering, University of Illinois, Urbana, IL 61801; (217) 333-0944.

0336 A Heliostat Cost-Analysis Tool: A computerized model aids in the evaluation and comparison of heliostat cost estimates

Department of Energy, Washington, DC.
Apr 84 *(C)*

A detailed structure of a heliostat cost-analysis tool (HELCAT) has been developed that processes manufacturing, transportation, and installation cost data. The estimated production costs of solar-energy systems serve as guides for future component development and as measures of the potential economic viability of the technologies. The analysis of heliostat costs is particularly important since the heliostat field is the largest cost component of a solar central-receiver plant. HELCAT is a computerized model that calculates a representative product price based on direct-input

data (e.g., direct materials, direct labor, capital requirements) and various economic, financial, and accounting assumptions.
FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-003879, price code: A04. For information not provided, contact Larry D. Brandt, Sandia National Laboratories. Livermore, CA 94550; (415) 422-2969.

0337 Hiding Solar-Array Bus Bars: End terminals are mounted under the cells, maximizing the usable illuminated area

National Aeronautics and Space Administration,
Washington, DC.
Jun 84 *(B, C)*

A new scheme for interconnecting cells in commercial solar panels allows the end terminals of a string of cells to be connected to bus bars that run under the cells. This results in a higher cell-packing density and higher silicon-utilization area than was achievable with earlier designs. Previously, the final tabbing at the edges of solar panels required larger frames, larger support structures, and, ultimately, larger array areas.
FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15755/TN.

High-Yield Alcohol Fermentation Process: Vacuum fermentation combined with vacuum distillation reduces energy needs

See 0102

0338 How Synfuels Behave in Gas Turbines: Combustion products can be different from those of petroleum-based fuels

Department of Energy, Washington, DC.
Mar 84 *(C, J)*

A program has studied two effects that could cause problems in the combustion of synthetic fuels in gas turbines. In particular, (1) the larger aromatic and smaller hydrogen contents anticipated in coal-derived fuels could result in increased soot production and (2) larger nitrogen contents anticipated in many alternative fuels could produce larger nitrogen oxide (NOx) emissions. Neither effect is desirable, and conventional control strategies for avoiding the two effects are not entirely compatible.
FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-013779, price code: A10. For information not provided, contact James D. Hickerson, Pittsburgh Energy Technology Center, P.O. Box 10940, Pittsburgh, PA 15236; (412) 675-5721.

0339 How To Build a Solar Space Heater for Your Own Home: Do-it-yourself manual shows how to make inexpensive solar panels that slash heating bills

Department of Energy, Washington, DC.
Mar 84 *(C)*

A homeowner can conserve energy (and reduce heating bills) by building simple solar-collection panels into the south side of his house. A solar-energy collector area of about 10 percent of the home floor space can supply about 25 percent of the yearly heat load. A 24-page manual tells precisely how to build and install the panels, which use readily available materials, require little maintenance, and can be constructed by anyone with a rudimentary knowledge of carpentry. The manual tells exactly what materials to buy, right down to the quantities and sizes of nails and screws. Photographs and drawings illustrate each step of the project. One of the most attractive features of this passive solar system is its ease of operation and almost complete lack of maintenance.
FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-003663, price code: A02.

0340 Hydrogen Production Driven by Fusion Reactor: Heat from the reactor blanket is joule-boosted to allow noncatalytic conversion of SO3 to SO2

Department of Energy, Washington, DC.
Oct 84 *(C)*

A proposed process utilizes heat from the blanket of a tandem-mirror fusion reactor to drive hydrogen-producing reactions. Heat from the reactor is used to produce electricity, which in turn, heats the SO3 decomposer to the level where catalysts normally required for the process become unnecessary. The decomposer produces the SO2 and O2 for the thermochemical production of hydrogen. By utilizing electrical heating in the decomposer, problems associated with having the reactor blanket the same temperature as the decomposer are eliminated.
FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PAT-APPL-6,266,248/NAB, price code: A02. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For further information, contact: Richard W. Werner, University of California, Lawrence Livermore National Laboratory, P.O. Box 808; Livermore, CA 94550.

0341 Hydrogen Production From Heavy Fuels: Better heat-transfer properties may avoid sulfur poisoning of the catalyst

National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(C, D)*

A monolithic supported catalyst allows the initiation of steam reforming to take place more rapidly at the inlet section of a reactor. This is due to the improved heat-transfer properties associated with this type of continuous-wall support, intimately in contact with the reactor wall. This advantage, coupled with a greatly reduced pressure drop in comparison to a conventional packed-bed catalyst, will permit the reforming of hydrocarbon fuels without requiring an increase in tube-wall temperatures and a change in tube materials. Because of the heat transfer benefits, steam reforming of sulfur-containing fuels heavier than the conventional naphtha (for example, No. 2 fuel oil) may be possible without higher tube-wall temperatures and sulfur poisoning.
FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-14826/TN.

Impact of Land-Based Biomass Production: Several models are evaluated

See 0914

Improved High-Current Drive Circuit: It uses a VMOS field-effect power transistor

See 0258

0342 Improved Negative Electrodes for Secondary Cells: Additives significantly improve cell capacity and stability over multiple discharges

Department of Energy, Washington, DC.
Nov 84 *(C)*

Two additives have been found which enhance the performance of lithium/aluminum negative electrodes in secondary electrochemical cells. The additives, graphitized carbon and Al5Fe2, are incorporated into the lithium/aluminum alloy and improve cell performance by reducing the buildup of lithium ions at the electrode face and preventing the agglomeration of lithium and aluminum ions within the porous body of the electrode.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,358,513, which is available from: Commissioner of Patents, Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For further information, contact Thomas D. Kaun, Argonne National Laboratory, 9700 South Cass Avenue, Argonne, IL 60439; (312) 972-7550.

0343 Improved Nickel-Cell Electrode Material: An ozonation process gives higher capacity

Department of Energy, Washington, DC.
Mar 84 *(G, H)*

Higher discharge capacity for Ni/Fe and Ni/Cd cells is the result of a new ozonation process in the manufacture of the active nickel-electrode material. The process may also reduce the cost of such cells by eliminating the need for expensive electrochemical precipitation. The improved electrode material is a mixture of 60 to 65 weight percent hydrated $Ni(OH)_2$, 5 to 40 weight percent hydrated NiO_2, and an alkali-metal doping of 0.2 to 2 atomic percent.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,330,603 which is available from: Commissioner of Patents, Washington, DC 20231 for $1. For licensing information contact: Office of Assistant General Counsel for Patents, US DOE, Washington, DC 20585. For further information contact: Dr. John F. Jackovitz, Westinghouse Research and Development Center, 1310 Beulah Road, Pittsburgh, PA 15235; (412) 256-5054.

Improved Radiative Control of Ribbon Growth: Shield modifications enhance growth rate while reducing silicon oxide formation
See 0104

Improvements in Gamma-Ray Coal-Level Sensors: Instrumentation is evaluated at an existing coal-gasification facility
See 0497

Instrumentation for an Energy-Conserving House: Sensors, data logging, and data processing are described
See 0075

0344 Insulation Cuts Steam Use: Payback for insulating nitrocellular boiling tubs is less than four years

Army Materiel Development and Readiness Command, Alexandria, VA.
Jun 84 *(C)*

Insulation was applied to the sides of nitrocellulose boiling tubs to quantify the possible reduction in steam use. This work was done for the U.S. Army Armament Research and Development Command. The insulation reduced steam usage by 18 percent and the payback period was 3.75 years at 1981 steam rates. The tubs were modified with two flanges welded around the top and the bottom. The bottom flange supported the insulation; and the top flange protected the insulation from water or nitrocellulose spills.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A114076, price code: A03 or contact project officer Sam M. Moy (201) 724-3065.

Insulation Deficiencies And Their Effects On Heat Loss In Housing
See 0076

0345 Integrating Wind Turbines Into a Conventional Utility

Department of Energy, Washington, DC.
Nov 84 *(C)*

A study analyzed what effects wind-data processing and wind forecasting would have on cost projections of integrating wind-turbine generation (WTG) into a conventional public utility. Four different simulation methods were used to estimate the output, all based on wind data recorded every 2 min to obtain 2-min power outputs. Accurate wind forecasts remain a major determinant in the adoption of WTG technology by public utilities.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-011154/NAB, price code: A04. For information not in the report, contact Alan H. Miller, Battelle, Pacific Northwest Laboratories, P.O. Box 999, Richland, WA 99352; (509) 375-3886.

0346 Interelectrode Separator for Lithium Cells: Enhanced wettability is obtained

Department of Energy, Washington, DC.
Nov 84 *(C)*

A new procedure improves the wettability of boron nitride separators for secondary electrochemical cells. Previously, separators made of boron nitride have exhibited good compatibility with the high-temperature environment of such cells and high electrical insulative properties but have shown limited wettability with the molten-salt electrolytes used. In the new procedure the boron nitride fibers of the felt of a fabric separator are treated with a decomposable salt of an alkaline earth metal, then heated to form a ceramic coating on the fibers. The organic salts can be a formate, acetate, or glycolate of either magnesium, barium, or strontium.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,360,578, which is available from: Commissioner of Patents, Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For further information, contact James E. Battles, Chemical

Technology Division, Argonne National Laboratory, 9700 South Cass Avenue, Argonne, IL 60439; (312) 972-4538.

Intermetallic Absorber for Hydrogen: A new compound offers a medium for separating hydrogen from other gases
See 0106

Landfill Gas Recovery: Existing and proposed methodologies for the recovery of methane from landfills are surveyed
See 0406

0347 Light, Serviceable Insulation Blanket: New features are a lighter facing and easy-to-use fastening system
National Aeronautics and Space Administration, Washington, DC.
Aug 84 *(H)*

An improved thermal-insulation blanket is lighter in weight, easier to remove and install, and less susceptible to crushing than was a previous design. The blanket should prove useful in vehicle construction and other applications in which low weight, easy removability for repairs, and long service life are important. The new blanket facing is made from an aluminized polyester (Kapton or equivalent) that has an organic antioxidant coating and is reinforced by nylon (Nomex or equivalent). Unlike the facing used in the earlier version (textured stainless-steel foil 0.002 in. (0.05 mm) thick), the new facing springs back after crushing. This increased resistance to crushing assures longer service life.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB83-925808, price code E02.

0348 Lighting-Control Strategies That Save Energy: Two automatic-control schemes offer substantial energy savings for commercial buildings
Department of Energy, Washington, DC.
Jul 84 *(C)*

The energy-saving benefits of two lighting-control strategies - scheduling and daylighting - were investigated at demonstration sites in two large commercial buildings. Several scheduling techniques were investigated, and the influence of switching-zone size on energy savings was examined. For the daylighting strategy, photoelectrically-controlled lighting systems were used to switch or dim lighting in accordance with available daylight. The strategies have a considerable potential for reducing lighting-energy consumption.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-018778/NAB, price code: A02.

0349 Lithium/ulfuryl Chloride Battery: Safety and long shelf life are sought
Army Materiel Development and Readiness Command, Alexandria, VA.
Jun 84 *(C)*

A high-rate lithium battery system that uses an inorganic catholyte made of sulfuryl chloride (SO2Cl2) is under development. The work, conducted for the U.S. Army Electronics Research and Development Command, is aimed at developing a potentially safer battery than the Li/SoCl2 system that has demonstrated attractive operational characteristics but presents a potential explosion hazard. Systems using Li/So2Cl2 are safer because no elemental sulfur is generated during battery discharge. Sulfur reacts explosively with lithium.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A120853, price code: A03.

0350 Lithium/Vanadium Oxide Storage Cells: Year-long study reveals high charge retention
Army Materiel Development and Readiness Command, Alexandria, VA.
Jun 84 *(C)*

Two lithium/vanadium oxide cells have been evaluated for their capacity to store full charges for 1 year at room temperature. The study, conducted for the U.S. Army Electronics Research and Development Command, is part of an ongoing program to develop lithium organic electrolyte battery cells with high energy densities, good rate characteristics, and long cycle life. The two types of cells included a laboratory cell containing two cathodes of stoichiometric V6O13, and a prismatic cell containing seven cathodes of nonstoichiometric vanadium oxide.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A123720, price code: A02 or contact project officer Herbert F. Hunger (201) 544-4210.

0351 Load Management for Residential Photovoltaic Systems: A simulation of a utility-connected photovoltaic system shows that onsite utilization of photovoltaic-generated electricity is decoupled from system value at reasonable buyback rates
Department of Energy, Washington, DC.
Apr 84 *(C)*

A computer model, applicable to residences with photovoltaic systems, simulates individual residential demand on an instantaneous basis. When combined with a supply model incorporating the utility interface and the option of battery storage, the computer model can be used to investigate the advantages of various load-management strategies in terms of system life-cycle cost.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-014434, price code: A07.

Lockhopper Valves for Coal Gasifiers: Better valves are under development
See 0666

0352 Low-Cost GaAs Solar Cells: A silicon substrate lowers cost and increases efficiency
National Aeronautics and Space Administration, Washington, DC.
Dec 84 *(C, H)*

A single-crystal gallium arsenide (GaAs) solar cell can be produced at greatly reduced cost by replacing the GaAs wafer substrate with a silicon substrate. These GaAs solar cells can be more effective than Si solar cells in hybrid photovoltaic/thermal systems with operating temperatures as high as 200C. The increased efficiency and decreased mass of these cells results in a smaller solar array for a given power output and reduces the required supporting structures.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for the commercial use of this invention should be addressed to Paul F. McCaul, NASA Resident Office-JPL, Mail Code: 180-601, 4800 Oak Grove Drive, Pasadena, CA 91103; (213) 354-2700. In either case refer to NPO-14914/TN.

Low-Pressure Alcohol Distillation: Heat requirements are lowered for the process
See 0107

0353 Low-Temperature Solar-Energy Systems: High efficiency is possible for industrial applications
Army Materiel Development and Readiness Command, Alexandria, VA.
Jun 84 *(C, D)*

Several types of solar-energy systems have been reviewed as potential replacements for systems that depend on fossil fuels to meet low-temperature, industrial-heating requirements. The work, conducted for the U.S. Army Armament Research and Development Command, covers systems delivering heat at 220 F or less for such applications as preheating boiler feedwater, domestic hot water and space heating, and hot water for industrial-manufacturing processes, such as metal cleaning, phosphating, and X-ray film processing.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A115464, price code: A03 or contact project officer Sam M. Moy (201) 724-3065.

Managing Coal-Combustion Wastes: A variety of options is explored in a guidebook
See 0409

Manometer Measures Gas Flow: Apparatus uses water displacement to measure gas flow at low rates
See 0513

0354 Measuring Diffusion and Recombination in Polycrystalline Silicon: Light-beam-induced currents yield information about solar-cell material
National Aeronautics and Space Administration, Washington, DC.
May 84 *(B, C, J, K)*

Minority-carrier diffusion length and surface recombination velocity in polycrystalline silicon are determined from measurements of light-beam-induced short-circuit currents. The technique is an updated version of the light-spot-scanning technique. It was developed for evaluation of the effects of processing changes on the properties of polycrystalline silicon on ceramic (SOC) for use in solar cells. The technique was used to evaluate SOC samples for the diffusion and recombination effects of cell processing and of chemical and structural defects.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15601/TN.

Measuring Slurry Flow: Noncontact ultrasonic instrument is accurate and versatile
See 0520

0355 Memory-Efficient Energy Network Has Been Developed
Department of Energy, Washington, DC.
Dec 84 *(A)*

An algorithm computes energy flows in energy system process model networks. It has been installed in North Star Horizon and Kaypro II microcomputers. The algorithm also computes environmental effects for each process. The algorithm provides capabilities to users of memory-limited desktop computers that were formerly available only on large machines. This system is currently operational on Horizon and Kaypro II. It is currently transferring to NEC PC-8201A (similar to TRS 80 Model 100).

FOR ADDITIONAL INFORMATION: Contact: W. Marcuse, Office of Research and Technology Applications, Brookhaven National Laboratory, Upton, Long Island, New York 11973; (516) 282-2103.

0356 Methane Hydrate - a Curiosity or a Vast Energy Resource: This icelike mixture may become a major source of natural gas
Department of Energy, Washington, DC.
Oct 84 *(C, J)*

A study is underway to determine the energy potential of deposits of icelike mixtures of natural gas and water known as methane hydrates. It is estimated that up to 90 percent of the world's ocean bottoms and more than 23 percent of the Earth's landmass may contain suitable conditions for methane hydrate formation. Methane hydrates consist of solid cagelike structures of water that physically entrap small gas molecules in structural voids or cavities.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE84-001900/NAB, price code: A04. For information not in the report, contact: Rodney Malone, Morgantown Energy Technology Center, P.O. Box 880, Morgantown, WV 26505.

Methane-Based Fuels for Automotive Fleet Vehicles: Publication shows how to exploit an alternative fuel for cars and trucks
See 1016

Modeling Landfill Methane Recovery: Two- and three-dimensional computer simulations are used for the analysis of gas recovery in landfills
See 0413

Molten Slag Would Boost Coal Conversion: A proposed reactor would increase the residence time of unconverted char
See 0676

0357 National Appropriate Technology Assistance Service Established: The service provides engineering, scientific and commercialization technical assistance for energy-related technologies
Department of Energy, Washington, DC.
Sep 84 *(C, D)*

The U.S. Department of Energy recently launched a new service to help Americans implement energy-saving appropriate technologies. Appropriate technology is the term for those practical technologies that lend themselves to self help and provide solutions to individual energy problems. The technologies usually include use of the sun, wind and water resources. Appropriate technologies also include energy and resource conservation methods. NATAS provides three primary services: tailored information responses, engineering/scientific technical assistance, and commercialization technical assistance. NATAS is available to assist anyone in the United States through a toll free number. However, it should prove most useful to energy innovators, homeowners, small businesses, farmers, state and local governments, non-profit organizations, and educational institutions..

FOR ADDITIONAL INFORMATION: The service is available by calling (800) 428-2525 (in Montana, (800) 428-1718) on any weekday from 9:00 a.m. to 6:00 p.m. Central time. Interested individuals can also write NATAS, U.S. Department of Energy, P.O. Box 2525, Butte, Montana 59702-2525.

Natural Gas Prospects in the Devonian Shales of the Eastern United States: Comprehensive study provides evaluation of natural gas resources in the Devonian Shale
See 0922

New Catalytic Reactions Cut Energy Requirements: Reactions that ordinarily consume a large amount of energy proceed at much lower temperatures
See 0117

Oil Recovery Enhancement With Paper Pulp Wastes
See 0420

Optical Receiver for a Prototype Remote-Sensing Natural Gas Leak Detector
See 0542

Oscillating-Crucible Technique for Silicon Growth: Technique would yield better mixing of impurities and superior-quality crystals
See 0122

Petroleum Crude Oil Reference Material Available
See 0124

Portable Data Logger for Photovoltaic Panels: Instrument measures rapidly changing knee of V-I curve with extra care
See 0545

Power System for Electrical Vehicles is Being Developed
See 1018

0358 Preparing Solar Cells for Soldering: Solder paste and contact ribbon are dispensed in synchronism
National Aeronautics and Space Administration,
Washington, DC.
Aug 84 *(C, F, G)*

A robotic machine applies dots of solder paste to solar cells and positions the contact ribbons on them. The machine operates on one cell at a time, preparing each cell for the soldering steps that follow. The solder-paste dispenser includes two manifolds. Each consists of a hollow aluminum box in which the solder paste is injected from a single supply cylinder to six nozzles.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15626/TN.

Pressure Reducer for Coal Gasifiers: Multistage device resists the action of hard particles entrained in gas
See 0128

0359 Preventing Moisture Damage To Solar Panels: A proposed encapsulant would dissociate water into gas
National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(C)*

Encapsulating photovoltaic solar cells with a polysulfonated membrane would prevent moisture damage to the cells. The membrane would prevent retention of moisture of moisture on the solar panels by dissociating any moisture into gaseous hydrogen and oxygen. The gases would escape through vents before damage can occur. The membrane dissociates water when an electrical potential is applied to opposite faces of the membrane. This potential is available from the panel itself as long as the solar cells are irradiated. In darkness, the electrical potential for the membrane can be supplied by an alternate source.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15481/TN.

0360 Primary Lithium/Organic Electrolyte Battery: Nonhazardous, high-temperature operation is obtained
Army Materiel Development and Readiness Command,
Alexandria, VA.
Jun 84 *(C)*

A primary lithium battery has been developed and fabricated for 15-V operation at temperatures up to 160 F. The work was conducted for the U.S. Army Electronics Research and Development Command. The battery consists of five hermetically sealed cells encased in a plastic jacket. Each cell uses a lithium/sulfur dioxide electrochemical system with a spirally-wound electrode core in which the cathode and anode are separated by an insulative microporous polypropylene barrier. To insure safe high-temperature operation, a pressure-activated safety vent is used to exhaust over-pressurized electrolyte. The battery is able to withstand environmental stresses, including temperature shock from -70 to 160 F, mechanical impact, vibration at frequencies from 5 to 200 Hz, and altitudes up to 40,000 ft.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A120858, price code: A04.

Primer is Developed for Measuring 60-Hz Fields
See 0550

Pyrheliometer With Improved Accuracy, Instrument maintains components at constant temperature and allows tenfold improvement in instrumental accuracy
See 0553

0361 Quantitative Analysis of Fire-Resistant Fuel: Spectrophotometry monitors proportions of fuel, emulsifier, and water
Army Materiel Development and Readiness Command,
Alexandria, VA.
Sep 84 *(C, J, K)*

A report describes a method for quantitative analysis of fire-resistant diesel fuel. The method employs an infrared spectrophotometer equipped with a data station. The method, which is being considered for monitoring the composition of fire-resistant fuel, mixed in the field, is also promising for commercial fuel production. The report is based on a study conducted for the U.S. Army Mobility Equipment Research and Development Command. The study concluded that infrared spectrophotometry is a relatively simple and fast method of monitoring the composition of fire-resistant fuel.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A133242/NAA, price code: A02, or contact project officer Shing-Bong Chen (703) 664-3576.

0362 Rechargeable Secondary Lithium Battery: Flat-plate 10- and 20-Ah batteries are demonstrated
Army Materiel Development and Readiness Command, Alexandria, VA.
Aug 84 *(C)*

The results are available of a study to develop improved electrodes and electrolyte systems for rechargeable lithium batteries. The work was conducted for the U.S. Army Electronics Research and Development Command. The positive-electrode material selected for investigation was Cr(0.5)V(0.5)S2 (CVS) due to its potential to outperform TiS2 electrodes both in volumetric and gravimetric energy densities at low- to medium-rate discharges. CVS also offers higher cell voltages with a mid-discharge voltage of 2.4 V. Optimum rate and rechargeability characteristics for the CVS cathode were obtained with the incorporation of 15 to 20 weight percent carbon.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A119297/NAA, price code: A05.

0363 Reducing Energy Costs in Frozen-Food Processing: A handbook describes methods to reduce the energy costs
Department of Energy, Washington, DC.
Apr 84 *(C, G)*

A handbook discusses ways a frozen-food processing industry can save energy and thus increase its profits. The proposed methods can save 12 or more percent of the energy consumption. For a typical frozen-food processing plant, which averages only 1 to 2 percent of after-tax profit on gross revenues, such savings become significant. The strategy to reduce the energy costs depends on such factors as the size of the frozen food plant, the number of shifts worked, the energy value of each fuel, the types of machinery and energy-use activities of the plant, and the cost of the fuels.

0364 Reducing Energy Costs in the Plastics Industry: A variety of simple, fast-payback methods are suggested
Department of Energy, Washington, DC.
May 84 *(C, G)*

A handbook presents ideas for saving energy in the plastics industry. The ideas can be put to immediate use, since they are based on currently available methods and materials. The recommendations in the handbook can reduce energy use by 10 percent or more. To produce the handbook, a team of financial analysts and engineers who specialize in energy issues developed case studies of a number of plastics plants located in different parts of the United States. Major subjects covered in the handbook are reducing the cost of process energy, reducing lighting costs, and reducing heating and cooling costs.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-006012, price code: A04. For information not in the report, contact XENERGY, Inc., 60 Mall Rd., Burlington, MA 01803; (617) 273-5700.

Reliability Guidelines for Solar Hot-Water Systems: Document consolidates available information in one publication
See 0080

Removing Biostatic Agents From Fermentation Solutions: Liquid carbon dioxide is an inexpensive solvent
See 0883

0365 Renewable Energy for Industry: Guidance is given for evaluating and financing biomass, waste, solar, and wind sources
Department of Energy, Washington, DC.
Oct 84 *(C)*

A guide helps industries evaluate, plan, and finance renewable-energy measures. It emphasizes technologies that have immediate, cost-effective applications in industry including the direct combustion and gasification of biomass (wood and other organic material) and the conversion of industrial-waste products to energy. It also covers several other renewable-energy technologies -- solar thermal energy (see figure), photovoltaics, and wind-energy conversion systems -- which have limited industrial applications at present but which will become increasingly competitive with oil and natural gas as the prices of these fuels rise. The guide may show many firms that it is feasible to use renewable-energy sources to supply all or part of their energy needs.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-012921/NAB, price code: A03.

Retaining Ring Fastener for Solar Panels: A collapsible linkage enables rapid installation and removal of panels
See 0701

Retort Utilizes Oil-Shale Fines: Additional energy is extracted, and waste disposal is simplified
See 0929

Retrofitting Diesels to Burn Alcohol: The problems and future potential of using ethanol as a fuel in diesel engines are discussed
See 0173

0366 Sampling Aquifer Thermal-Energy Storage Systems: Guidelines are offered for gathering, storing, and analyzing water specimens
Department of Energy, Washington, DC.
Dec 84 *(C, J, K)*

A published guideline presents procedures for collecting complete and accurate chemical data and related physical data on seasonal thermal-energy storage systems. In a typical storage system, ground water is pumped from wells, raised in temperature by surplus industrial heat, and reinjected into the aquifer for storage and seasonal energy needs. The heating, aeration, and subsequent cooling of the water may plug the aquifer, degrade water quality, and promote corrosion of the surface plant and downhole equipment.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-001852/NAB, price code: A02. For information not in the report, contact:

William J. Deutsch, Battelle Pacific Northwest Laboratories, PO Box 999; Richland, WA 99352.

Shielded Aluminum Flat-Conductor Cable: Thin wiring harness stores compactly
See 0288

Short-Rotation Forestry: Current state-of-the-art and future research topics are described
See 0931

Simulating Transportation and Storage in Coal Refining: Computer model analyzes hypothetical situations and highlights problems
See 0431

Solar Drying of Sludge: Greenhouse Versus Open Bed: The protection greenhouses afford against rain may not be necessary
See 0432

Solar Energy for Industrial Processes: Thermal systems could provide heat-delivery rates of 2.8 to 3.4 GJ/yr/sq m at a cost of $50/GJ/yr
See 0715

Solar Energy Studies Computer Program Developed
See 0081

Solar Rotary Kiln: Unit decomposes zinc sulfate and other low-absorptivity materials efficiently
See 0716

0367 Solar-Cell Slide Rule: Slide rule relates efficiency, impurity types, impurity concentrations, and process types
National Aeronautics and Space Administration, Washington, DC.
Feb 84 *(C)*

A slide rule developed at NASA's Jet Propulsion Laboratory calculates the efficiency of silicon solar cells as a function of the concentration of impurities in the cell material. It can be used to evaluate crystal-growth methods involving sequential or continuous replenishment of the melt. The slide rule is useful because the effects of impurities on solar-cell performance depend not only on the type of impurity but also on the silicon-growth process - and various processes are being developed for the production of low-cost photovoltaic cells.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15646/TN.

Solar-Collector Radiometer: Unit measures up to 30,000 solar constants with 1 percent accuracy
See 0562

0368 Solutions of Transonic Flow in Turbomachines: Accurate approximations are obtained using perturbation techniques
National Aeronautics and Space Administration, Washington, DC.
Nov 84 *(A, D, F)*

Perturbation procedures and associated computational codes were developed for determining nonlinear flow solutions of transonic flows in turbomachines. The perturbation procedures determine highly accurate approximations to families of nonlinear solutions that are either continuous or discontinuous and that represent variations in some arbitrary parameter. The computer program is configured to predict and plot an arbitrary flow variable (e.g., pressure coefficient) on the surface of a blade or airfoil and can account for the motion of: (a) one or more critical points (shock points), (b) a stagnation point, and (c) a maximum-suction-pressure point, or simultaneously for any combination of these.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602; (404) 542-3265. Refer to LEW-13896/TN.

0369 Stability of Tube Rows in Crossflow: Two instability mechanisms are identified in heat-exchanger tube bundles
Department of Energy, Washington, DC.
Jun 84 *(D, J)*

High-velocity flow across a tube array can cause tube instability, which may result in extensive tube damage in a short time. The prediction of instability-flow velocity remains a difficult task. Various empirical correlations have been proposed to establish the instability-flow velocity as a function of the mass-damping parameter. A report presents additional analytical results and experimental data on tube rows in crossflow. Analyses and tests are presented, detailing the effects of various system parameters.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-004398, price code: A04.

Staging Two-Phase Turbines: Turbine efficiency is 70 percent with staging as compared to 63 percent without staging
See 0174

Starting Silicon-Ribbon Growth Automatically: A programable two-channel controller reproduces standardized growth conditions
See 0134

Stirred Reactor Dynamics: Effects of the vortex induced by a stirrer are examined
See 0135

Studies of the Inverted-Meniscus Deposition of Silicon on Ceramic: Controlled temperature profiles are essential to the production of solar cells
See 0836

Supercritical Fluid Extraction Method is Developed
See 0136

Supercritical-Multiple-Solvent Extraction From Coal: Large and small molecules dissolve different constituents
See 0137

0370 Superefficient VAR Controller: A superconducting coil controls reactive power with minimal loss
Department of Energy, Washington, DC.
Nov 84 *(B)*

A circuit controls the phase of ac powerlines with high efficiency to yield essentially zero reactive volt-amperes. The high efficiency of the circuit results from the use of a dc superconducting coil as the inductive element. The circuit can control 40 MVAR with a loss of less than 50 W. The new circuit employs an asymmetrical Graetz bridge of silicon-controlled rectifiers, the firing angles of which are controlled to vary the dc voltage on the coil so that the direct current in the coil remains constant. The circuit can be constructed for single-phase or multi-phase powerlines.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,348,630, which is available from: Commissioner of Patents, Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For additional information, contact the inventor: Heinrich J. Boenig, CTR-9, MS D464, Los Alamos National Laboratory, P.O. Box 1663, Los Alamos, NM 87545, (505) 667-4404.

0371 Ternary Compound Electrodes for Molten-Salt Cells: Corrosion is reduced, and fabrication is simplified

Department of Energy, Washington, DC.
Jun 84 *(C, J)*

Ternary compounds of the type Li(x)M(y)O(z) (where M is Fe, Co, Ni, or another transition metal) serve as improved reactant materials for the positive electrodes of molten-lithium-salt electric storage cells. The FeS and FeS2 electrodes that have been used are corrosive at the 350 to 500 C cell operating temperatures, causing the degradation of current collectors, containers, and seals. The ternary oxides are much less corrosive. Moreover, they permit high current densities and do not substantially engage in current-inefficient side reactions with the potassium ions that normally occur in molten-electrolyte salts.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,340,652, which is available from: Commissioner of Patents, Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, US DOE, Washington, DC 20585. For further information, contact: Ian D. Raistrick, Stanford University, Department of Materials Science and Engineering, Stanford, CA 94305.

A Test for the Recovery of Waste Energy in a Fishing Vessel
See 0947

Thermal Radiation Model Renodalization: Simplified radiation models reduce programing cost
See 0995

Turning Wastes Into Resources: Report describes innovative improvements in sewage management
See 0441

0372 Two-Evaporator Refrigerator With Refrigerant Mixture: Results of optimization study are tested

Department of Energy, Washington, DC.
Sep 84 *(D)*

A computer simulation model for a refrigerator system employing two evaporators and a nonazeotropic refrigerant mixture is used to optimize the mixture concentration and the distribution of heat-transfer area. Thermodynamic analysis has shown that nonazeotropic mixtures of refrigerants can increase thermal efficiency by reducing power requirements of the compressor. The refrigerants tested were binary mixtures of R12 and R114. The results of the optimization study showed that two mixtures -- 30-percent (by mass) and 70-percent R114 -- would provide minimum energy consumption. The results enable refinement of the computer model in the areas of heat-transfer coefficients, pressure drops of the refrigerant in condensers and evaporators, and compressor power.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-020488, price code: A04.

0373 Two-Fluid Solar Pond: Proposed insulated covered cavity would absorb and store solar energy in its lower heavier layer

National Aeronautics and Space Administration, Washington, DC.
Oct 84 *(C)*

An insulated plastic-covered solar pond is proposed that would use two immiscible liquids of different densities to collect and store solar energy. The lighter density fluid, which is transparent to short-wavelength solar radiation, passes the radiation to the higher density fluid and minimizes upward ultraviolet-radiation losses. Adding a black dye to the bottom fluid enhances the absorption of the pond and its collection and storage efficiency. The small aperture of the pond cavity gives the pond the radiation-retention properties of a blackbody.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning license for its commercial development should be addressed to Paul F. McCaul, NASA Resident Office-JPL, Mail Code: 180-601, 4800 Oak Grove Drive, Pasadena, CA 91103; (213) 354-2700. In either case refer to NPO-15419/TN.

0374 Two-Stage Off-Axis Cylindrical Solar Concentrator: The reflector for a photovoltaic power supply uses off-axis geometry for efficient uniform illumination

National Aeronautics and Space Administration, Washington, DC.
Oct 84 *(C)*

A two-stage off-axis parabolic cylindrical concentrator has been designed for the illumination of photovoltaic cells. Nonimaging secondary concentrators in combination with focusing primary elements achieve maximum concentration for an acceptance angle of 4.25 deg. while maintaining relatively uniform illumination of the cell plane. The cylindrical geometry permits easy furling and unfurling of the mirrors for transport and deployment.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15484/TN.

0375 Value of Wind and Solar Thermal Energy: Computer programs allow utilities to determine overall electric-energy production costs

Department of Energy, Washington, DC.
Jun 84 *(C)*

Two reports describe computer models for determining the value of solar-energy power systems to electric utilities. The models allow utility planners to integrate intermittent-generation sources into a utility production-cost model. One two-volume report presents information for determining the value of wind energy. The first volume begins with an overview of the method of value determination and a brief description of the process. The second volume is a user's guide and covers required inputs, available outputs, important internal variables, and external data files. The second report deals with value determination for solar-thermal electric power. It contains an overview of a set of five programs and separate sections describing each of the programs in detail.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order numbers: DE82-010771, DE82-010926, and DE82-021997, price codes: A05, A06, and A05.

Waste Disposal at Synthetic-Fuel Plants: Disposal is examined from engineering, environmental, and economic viewpoints
See 0442

Waste Oils Fuel Navy Boilers
See 0443

Water Panels for Passive Heating: Tankwall sections absorb solar energy with little reradiation to the outside
See 0083

0376 Wind Turbine With Concentric Ducts: Proposed device would be relatively compact and efficient

National Aeronautics and Space Administration, Washington, DC.
Feb 84 *(C, D, F)*

A wind turbine concept would employ two concentric ducts to increase the air-pressure differential across the turbine blades and thereby to extract additional work from a given amount of wind energy. It is expected to be suitable for installation on such existing structures as water towers, barns, houses, and commercial buildings. Air enters the turbine duct, and its velocity increases as it flows over the nose cone in the interior duct, in which the cross-sectional area gradually decreases. The air velocity in the inner duct reaches a maximum as the air enters the turbine.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: KSC-11191/TN.

0377 Wood-Fueled Boiler Unit: Study evaluates the efficiency and emissions of a prototype central-heating unit

Department of Energy, Washington, DC.
Mar 84 *(C)*

A series of tests performed on a prototype wood-fueled boiler have demonstrated a very efficient operation combined with a low-emission performance. Wood-fueled boilers designed as central-heating units are expected to get a significant share of the market. This anticipated rapid growth has created the need for efficient, clean-burning, safe, and convenient-to-operate boilers. One such boiler unit was developed and tested in this program. In this new boiler, a combustion chamber and a flue are both incorporated within a large thermal-energy storage tank, which utilizes water as the primary storage medium. Surrounding the combustion chamber and stack with such a large mass of nonpressurized water permits safe, rapid combustion rates of up to 150 lb of wood per hour.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-010361, price code: A04.

ENVIRONMENTAL POLLUTION & CONTROL

0378 Activated Carbon Process for the Treatment of Cadmium(II)-Containing Wastewaters

Environmental Protection Agency, Washington, DC.
Jun 84 *(D)*

It has been estimated that more than 45% of all cadmium is used in electroplating, and that 10% of total industrial cadmium use ends up in wastewater streams. The removal of cadmium(II) from wastewater stream, therefore, is of great importance, especially in the protection of human health. The major objective of a research project was to investigate the treatability of activated carbon adsorption process for cadmium(II)-containing wastewater. Major factors affecting the extent of cadmium(II) removal by activated carbon adsorption process, such as pH, particle size, mixing rate, carbon types, carbon-to-cadmium ratio, ionic strength, and temperature were thoroughly studied. Both batch and column reactors were used. An effort was made to estimate costs of activated carbon adsorption processes.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB83-247155, price code: A06 or contact Mary Stinson, Industrial Environmental Research Laboratory, U.S. Environmental Protection Agency, Cincinnati, OH 45268.

0379 Air Land Water Analysis System (ALWAS): A Multi-Media Model for Toxic Substances

Environmental Protection Agency, Washington, DC.
Dec 84 *(E, J)*

ALWAS is a multi-media environmental model for describing the atmospheric dispersion of toxicants, the surface runoff of deposited toxicants, and the subsequent fate of these materials in surface water bodies. ALWAS depicts the spatial and temporal distribution of contaminant concentrations in a watershed and the air above it. ALWAS is appropriate for evaluating multi-media water quality problems of watersheds as large as 10,000 sq km. The full report incorporates detailed software documentation and a user's manual. The sensitivity of model results to uncertainties in key input parameters is investigated for a hypothetical simulation of benzo(a)-pyrene behavior in a small urban watershed.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB84-171743/NAC, price $34. For software of this model or for information not in the report, Contact: Mr. Lee Mulkey, U.S. Environmental Protection Agency, Environmental Research Laboratory, Athens, GA 30613; (404) 546-3581.

0380 Alternate Treatment of Organic Solvents and Sludges from Metal Finishing Operations

Environmental Protection Agency, Washington, DC.
Jul 84 *(D)*

The objectives of a study were to describe the metal finishing industry and its use of organic materials, describe the quantity and composition of organic wastes from metal finishing, describe the current technologies used to recover and dispose of these materials, and draw conclusions and make recommendations on future work which needs to be done to improve ways to reuse or dispose of organic residues from metal finishing operations. The metal finishing industry uses significant amounts of organic materials in its metal working processes, in solvent cleaning, and in product coating processes. Data on the quantities and compositions of these wastes were collected from literature sources, industry sources, and state and environmental agency files. Processes for handling these wastes were described and recommendations were made for future work to promote the safe disposal of these organic residues.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB84-102151, price code: A16, or contact Alfred B. Craig, Jr., S. Gary Howell, Industrial Environmental Research Laboratory, U.S. Environmental Protection Agency, Cincinnati, OH 45268.

0381 Analysis of Polynuclear Aromatic Hydrocarbons in Particulate Matter by Luminescence Techniques

Environmental Protection Agency, Washington, DC.
Oct 84 *(J)*

A project involved an exploratory study to evaluate the potential of optical fluorescence and phosphorescence techniques for the direct analysis of polycyclic aromatic hydrocarbons (PAHs) in urban particulate samples. Current chemical procedures for the analysis of PAHs in particulate samples are both time consuming and expensive. As a basis for these studies, ten major PAHs typically found in urban particulates were selected as reference compounds. These compounds were used individually and in mixtures of various complexities on quartz substrates and on particulate samples to generate luminescence data for evaluating the utility of the fluorescence and heavy-metal-activated room-temperature phosphorescence (RTP) techniques for the direct analysis of PAHs on particulate materials.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB84-181882/NAC, price: $10, or contact the EPA Project Officer: Nancy Wilson, Environmental Monitoring Systems Laboratory, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711.

0382 Analytical Procedures for Aniline and Selected Derivatives in Wastewater and Sludge

Environmental Protection Agency, Washington, DC.
Aug 84 *(J)*

A detailed evaluation of gas chromatography (GC) and high performance liquid chromatography (HPLC) for the determination of anilines in aqueous media has been conducted. The most applicable procedure was found to be GC with thermionic nitrogen-phosphorus selective detection (NPD). This GC method is capable of determining a wide variety of anilines at low part per billion (ppb) level in industrial aqueous discharges, as well as effluents from publicly owned treatment works (POTW's).

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB84-140102/NAC, price: $20.50, or contact Fred K. Kawahara, Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, Cincinnati, OH 45268.

0383 Analyzing Resource Recovery From Waste: The economics of conventional landfill disposal can be compared with the economics for material and energy recovery

Department of Energy, Washington, DC.
Sep 84 *(C, D)*

A workbook provides guidance for public officials in setting up facilities for recovering resources from solid waste. The recoverable resources include energy and materials, such as paper, iron alloys, aluminum, and glass. The workbook provides a step-by-step method that can be used to determine the economic feasibility of centralized resource recovery from municipal solid waste. The method encompasses the total solid-waste management system including hauling costs. It allows a realistic comparison of the economics of disposal waste by landfill and by resource recovery. The potential for resource recovery is estimated in terms of the amounts of recoverable material and their value.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-008972, price code: A09. For information not provided in the report, contact Donald K. Walter, U.S. DOE, CE-323, 1000 Independence Avenue, NW, Washington, DC 20585; (202) 252-1697.

0384 Asbestos Fiber Determination in Water Samples: Preparation techniques, improved analytical method, and rapid screening

Environmental Protection Agency, Washington, DC.
Jul 84 *(J, K)*

A three-year study was conducted to improve the analytical method for determination of asbestos fiber concentrations in water samples. The research produced an improved sample preparation and analysis methodology and an alternative method with the potential for routinely screening drinking water samples for asbestos. Sample preparation techniques investigated included the drop and collapsed membrane filter techniques. Compared with plasma ashing, ozone-ultraviolet light oxidation of water samples was found to be a simpler and superior technique for removal of organic materials. An improved analytical method for determination of asbestos fiber concentrations in water samples was developed. A rapid, fixed-fiber alignment method and a dynamic method of fiber measurement were studied.

FOR ADDITIONAL INFORMATION: This summary is based on the three reports: 'Rapid Screening Technique for Detection of Asbestos Fibers in Water Samples,' (NTIS Order No. PB83-262915; Cost: $11.50), 'Development of Improved Analytical Techniques for Determination of Asbestos in Water Samples,' (NTIS Order No. PB83-261651; Cost $14.50), 'Analytical Method for Determination of Asbestos Fibers in Water,' (NTIS Order No. PB83-260471; Cost: $23.50). For other information, contact J.M. Long, Environmental Research Laboratory, U.S. Environmental Protection Agency, College Station Road, Athens, GA 30613.

0385 Asbestos Removal And Disposal Information System

Department of Energy, Washington, DC.
Feb 84 *(A, D)*

An on-line management information system has been developed to provide file maintenance and information retrievability for demolition or renovation operations involving friable asbestos material. The U.S. Environmental Protection Agency, under the National Emissions Standards for Hazardous Air Pollutants, requires that accurate records be maintained for all friable asbestos removal and disposal operations. The System 1022 SCOPE computer program provides data entry of accounting information, file maintenance, and generation of totals. The computer program (ASBSO1) is currently in routine use. A potential area of application is in waste management and disposal operations involving asbestos materials. The program is extremely functional for record maintenance.

FOR ADDITIONAL INFORMATION: Contact: D. W. Jared, Oak Ridge National Laboratory, P.O. Box X, Oak Ridge, TN 37830; (615) 574-4192. Refer to 461/XTN.

Assessing Landfill Gas Recovery Projects: Factors are provided for determining technical and economic feasibility of existing landfills

See 0303

0386 Assessment of Landfill Methane Recovery: An assessment of the pros and cons and an annotated bibliography provide information on this untapped energy source

Department of Energy, Washington, DC.

Apr 84 *(C)*

Two reports address various issues faced by landfill methane-recovery technology. One report addresses the environmental impacts, institutional problems, and research needs of this potentially lucrative source of energy. The second report is an annotated bibliography that contains 318 entries dealing with environmental impacts of sanitary landfills and gas-recovery systems.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order numbers: DE82-005598 and DE82-012604, price codes: A04 and A06. For information not provided, contact Michael L. Wilkey, P.E., Gas Research Institute, 8600 W. Bryn Mawr, Chicago, IL 60631; (312) 399-8321.

0387 Bromination Process for Disposal of Spilled Hazardous Materials

Environmental Protection Agency, Washington, DC.

Jun 84 *(D, J)*

A novel process was tested for oxidizing organic materials, including so-called refractory organics and pesticides. Bromine and water were allowed to react with such materials at 250 to 300C to form carbon dioxide and aqueous hydrobromic acid. The HBr solution can be electrolyzed at ambient conditions, using a membraneless electrolysis cell, to produce hydrogen and regenerate bromine for recycling. The byproduct hydrogen can be sold or used as fuel for the process. A conceptual design for a larger-scale system was developed on the basis of the laboratory and pilot-plant results.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB83-263806, price: $10, or contact John E. Brugger, Oil and Hazardous Materials Spill Branch, Municipal Environmental Research Laboratory-Cincinnati, U.S. Environmental Protection Agency, Edison, NJ 08837.

0388 Cannon Reduces Municipal Solid Wastes: A pressure vessel uses explosive decompression to shred solid wastes into small particles

Department of Energy, Washington, DC.

Apr 84 *(D)*

A recently developed pressure vessel, also called a 'cannon', successfully reduces municipal solid wastes (MSW's) to small pieces. The cannon is mounted on a trailer equipped with water tanks, a boiler, a motor/generator, a hydraulic compactor, a fuel tank, and a control panel. This unit can be towed to waste-disposal sites to do its work on location. The steam, superheated at temperatures of up to 900F, enters through the back end of the cannon tube. The steam saturates the refuse inside the tube for a predetermined amount of time. It was found that pressures at 150 psig for 35 minutes followed by 200 psig for 10 minutes before the discharge produced the most acceptable results. Paper, plastics, rubber, yard waste, metal containers, wood, glass, and food residues were reduced to small pieces.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE81-025850, price code: A03.

0389 Compatibility of Grouts with Hazardous Wastes

Environmental Protection Agency, Washington, DC.

Nov 84 *(H, J)*

A study was conducted to determine existing information on the compatibility of grouts with different classes of chemicals. The data gathered can be used as a guide for testing and selecting grouts to be used at specific waste disposal sites with various leachates. The 12 types of grouts used in this study were chosen because of their availability and use in waterproofing and soil consolidation projects. These grouts are bitumen, Portland cement Type I, Portland cement Types II and V, clay, clay-cement, silicate, acrylamide, phenolic, urethane, urea-formaldehyde, epoxy, and polyester.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB84-139732/NAC, price code: A08, or contact Herbert R. Pahren, Municipal Environmental Research Laboratory, U.S. Environmental Protection Agency, Cincinnati, OH 45268.

0390 Computer Model Developed to Help Predict Solutions to Electrostatic Precipitators Problems

Environmental Protection Agency, Washington, DC.

Nov 84 *(A, D)*

Microcomputer technology is now being used to help researchers solve industrial pollution problems. The U.S. EPA is evaluating a new state-of-the-art computer model designed to predict the operating behavior of electrostatic precipitators (ESPs). The effectiveness of the ESPs in removing particles from flue gases is dependent on the strength of the electrical field inside the ESP, the type of coal being burned, the electrical properties of fly ash, and the amount of particles being collected. Variations in all these will affect performance. Scientists at EPA's Industrial Environmental Research Laboratory are using a microcomputer with high resolution, color-coded graphics to present a visual display of the electrostatic precipitation process. The prototype model can be programmed to test the effects of ESP design modifications. The model can also evaluate how well the ESP operates when used in combination with other control techniques. The laboratory is currently verifying the results of the experimental computer model with results from tests performed on inhouse and field pilot units.

FOR ADDITIONAL INFORMATION: Contact: Dr. Leslie Sparks, U.S. EPA, Industrial and Environmental Research Laboratory, Mail Stop 61, Research Triangle Park, NC

27711, (919) 541-2458. Software for this model is being developed and will be available.

Controlling Industrial Noise: A handbook gives theoretical background and practical advice
See 0613

Descriptions For Reservoir Chemical Processes Are Developed
See 0144

0391 Desulfurizing Coal by Chlorinolysis and Hydrogenation: A two-process combination removes more sulfur than either process alone

National Aeronautics and Space Administration, Washington, DC.
Jun 84 *(C, D)*

More than 85 percent of the organic and pyritic sulfur in coal is removed by a combination of chlorinolysis and hydrogenation, according to experiments. Chlorinolysis removes about 30 percent of the organic sulfur but becomes ineffective when a higher removal percentage is attempted. Hydrogenation removes more than 60 percent of the organic sulfur remaining after chlorinolysis but is otherwise generally ineffective unless the coal has first been chlorinated. Thus the two steps are complementary.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15304/TN.

Development of a Continuous Monitor for Detection of Toxic Organic Compounds
See 0469

Development, Design, and Operation of a Cascade Impactor
See 0470

0392 Diesel Particulate Destruction: A pulsed electrical discharge eliminates particulates in diesel exhaust

National Aeronautics and Space Administration, Washington, DC.
Oct 84 *(D)*

Particulates in diesel exhaust gas can be destroyed by passing them through an agglomerator and a series of high-voltage-biased grids. The particulates, being semiconductive, initiate spark discharges along the grid/gas interface. The sparks have high temperature (>5,000 K) and high plasma density. Thus they can erode or induce combustion of the particulates. The technique also offers a way of instantaneously measuring the particulate mass in diesel exhaust.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning license for its commercial development should be addressed to Paul F. McCaul, NASA Resident Office-JPL, Mail Code: 180-601, 4800 Oak Grove Drive, Pasadena, CA 91103; (213) 354-2700. In either case refer to NPO-15426/TN.

0393 Dynamic Simulation of Chemical Processes: A variety of software packages are evaluated

Department of Energy, Washington, DC.
Aug 84 *(A, C, D)*

A report traces the development of dynamic process simulators and identifies features that must be evaluated during a selection procedure. The report focuses on software that can be used in investigations of control strategies for a plant for converting high-sulfur bituminous coals into environmentally acceptable solid and liquid fuels. Certain features are grouped together to create general-purpose dynamic process simulators that are especially convenient for use by chemical process engineers. In applying such a general-purpose program to a specific plant, the user simply provides additional software for features that are unique to the plant and not provided by the simulator.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-007989/NAB, price code: A21. For information not provided in the report, contact: Joseph F. Daly, SRC-1 Project Manager, U.S. Department of Energy, P.O. Box 2752, Allentown, PA 18001; (215) 481-1333.

0394 Energy and Air Quality: Handbook aids in planning the growth of energy facilities

Department of Energy, Washington, DC.
May 84 *(C)*

The handbook, which is a part of the Environmental Handbook Series, describes the effects on the air quality of energy development. It summarizes the major Federal legislation regulating potential effects on the air quality of energy facilities and influencing the locations and timing of energy development. In addition, the handbook describes and presents the data that can be used as the basis for a measurement and, in some cases, prediction of the potential conflicts between energy development and ensuring clean air.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-008132, price code: A13.

0395 Energy and Solid/Hazardous Waste: Data are presented on wastes from a variety of energy technologies

Department of Energy, Washington, DC.
Aug 84 *(C)*

'Energy and Solid/Hazardous Waste' handbook, a part of the Department of Energy's Environmental Information Handbook Series, addresses the past and potential future effects of solid and hazardous waste from energy development. The handbook summarizes the major environmental legislation applicable to solid-and hazardous-waste generation and disposal. The book emphasizes coal combustion, gasification, and liquefaction and oil-shale technologies. Some of the major topics relating to solid- and hazardous-waste management are reviewed. Solid waste is described from various aspects, such as quantity produced, hazard characteristics, and waste utilization.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-006964/NAB, price code: A11.

Energy and Water Resources: Data on uses, problems, and regulations are presented
See 0907

Energy Integrated Farm System: Mathis Farm and Georgia Institute of Technology
See 0023

0396 Energy Technologies and the Environment: A Handbook: The effects of key technologies over the next 20 years are examined
Department of Energy, Washington, DC.
Aug 84 *(C, D)*

'Energy Technologies and the Environment' is a handbook discussing the effects of various energy technologies on the environment. Published as a part of the Environmental Information Handbook Series by the Department of Energy, the handbook deals with technologies that are expected to play a significant role during the next 20 years. Each chapter covering an energy-producing technology follows a similar five-part format: background, technology, environmental issues, environmental controls, and environmental constraints.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE81-029809/NAB, price code: A22.

0397 Environmental Data on Energy Technologies: Handbook shows environmental data for major energy technologies
Department of Energy, Washington, DC.
Nov 84 *(C, D, E, G, K)*

The handbook describes the environmental characterizations of various modern energy-producing technologies. It shows data the Department of Energy uses for policy planning and the analysis of its energy programs. Information in the handbook is intended to assist in the decisionmaking and research on environmental issues the energy-producing industries face. The specific energy technologies included in the handbook are divided into the following subjects: nuclear, petroleum, natural gas, synthetic fuels, coal, solar, geothermal, and hydroelectric. Each technology is characterized in terms of the resources required, costs, residuals released, energy products, and occupational safety and health data.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-016339/NAB, price: $79.

0398 Environmental Hazards of TNT: Reactions between TNT and soil components are discussed
Army Materiel Development and Readiness Command, Alexandria, VA.
Oct 84 *(E)*

Trinitrotoluene (TNT) has been the most abundantly produced munition over the past several decades and has been responsible for ground water, lagoon, and soil contamination problems. In a study conducted by the U.S. Army Natick Research and Development Laboratories, the soil biochemistry and microbiology of TNT and some of its derivatives have been investigated to identify the nature of TNT soil contamination. Specifically, two areas were addressed: the binding of TNT and its derivatives to humic acid, which is an important component of soil, and the reaction of TNT and its derivatives to peroxidase, an enzyme commonly found in soil. Results have shown that significant binding does not occur with TNT itself but with some of the reduction products of TNT resulting from microbial metabolism.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A135512/NAA, price code: A03, or contact project officer David L. Kaplan (617) 633-4983.

0399 EPA Macroscopic Planning Model (EPAMAC) for Stormwater and Combined Sewer Overflow Control: Application Guide and User's Manual
Environmental Protection Agency, Washington, DC.
Aug 84 *(D)*

A simplified stormwater management model known as EPAMAC (EPA Macroscopic Planning Model) has been developed to provide an inexpensive, flexible tool for planning and preliminary sizing of stormwater facilities. Documentation of the model and instructions for data preparation and application are included in the user's guide portion of the report. The model was effectively used to compare a large number of alternative storage and treatment facilities and to optimize their sizing. EPAMAC is a special purpose, continuous simulation model for surface runoff. The model has minimal input data requirements, broad areal and temporal coverage, and both flexibility and ease of application. EPAMAC was developed as part of a methodology for managing stormwater that uses both simple computer programs and hand computations.

FOR ADDITIONAL INFORMATION: Contact: Mr. Doug Ammon, U.S. Environmental Protection Agency, Cincinnatti, OH 45268; (513) 684-7875.

0400 Evaluation of a Containment Barrier for Hazardous Material Spills in Watercourses
Environmental Protection Agency, Washington, DC.
May 84 *(D)*

A project was undertaken to design, develop, and evaluate a physical barrier system to contain accidental concentrated spills of insoluble hazardous materials in water. The system was to be effective in flowing water, light-weight, easily transportable, and capable of being deployed by a minimum number of trained personnel. A prototype barrier designed to meet the above criteria was constructed of a flexible, fiber-reinforced plastic curtain with air-inflatable flotation.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB84-123942, price $10. For other information, contact Ira Wilder, Oil and Hazardous Materials Spills Branch, Municipal Environmental Research Laboratory--Cincinnati, U.S. Environmental Protection Agency, Edison, NJ 08837.

0401 Fail-Safe Transfer Line for Hazardous Fluids
Environmental Protection Agency, Washington, DC.
Jul 84 *(D, F)*

A fail-safe transfer line for hazardous liquids was designed, fabricated, tested in the laboratory, and then used in actual fluid transfer operations. The system provides a 2-in.-ID flexible hose line for offloading tank cars or trucks and detects leaks by monitoring flow inventory with corrosion-resistant, turbine-type flow meters at the inlet and outlet ends. Reliable shutdown of the line at leak rates as low as 1% of flow is achieved. The line is also automatically shut down when electrical power or valve actuator pressure is lost, or when any sensor or control cable is severed. The system meets the National Electrical Code explosion-proof standards for Class 1, Division 1, Group C or D environment. The system is recommended for use with materials that remain in a liquid state under all normal conditions.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB84-112705/NAC, price code: A03, or contact John E. Brugger, Municipal Environmental Research Laboratory -Cincinnati, U.S. Environmental Protection Agency, Edison, NJ 08837.

Flowthrough Bacteria-Detection System: An online system allows repetitive cycling of sample intake, bacteria counting, and sterilization
See 0484

0402 Formation of Nitrosamines Under Denitrification Conditions: Microbial denitrification systems may produce toxic, carcinogenic nitrosamines
Army Materiel Development and Readiness Command, Alexandria, VA.
Dec 84 *(E, J)*

Anaerobic bacteria denitrify high-nitrate waste materials more efficiently than catalysts. An experiment conducted for the U.S. Army Toxic and Hazardous Materials Agency, however, indicates that nitrosamines may form during microbial denitrification when nitrites, generated as intermediate products, react with secondary or tertiary amines. Dimethylamine (DMA), dipropylamine (DPA), dibutylamine (DBA), and diethanolamine (DEA) were evaluated in batch- and continuous-culture microbial systems with loads of trimethylammonium nitrate and triethanolammonium nitrate.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A135541/NAA, price code: A03, or contact project officer: D.L. Kaplan (617) 633-4983.

Generating SiF4 From H2SiF6: Sodium and barium fluorosilicates are precipitated and then thermally decomposed into silicon tetrafluoride
See 0100

0403 Guidelines for Monitoring Indoor Air Quality
Environmental Protection Agency, Washington, DC.
Aug 84 *(J)*

Guidelines were developed for designing programs to measure indoor air quality. Brief summaries of past and current research and descriptions of indoor contaminants provide a background for developing the monitoring design. Factors that influence indoor air quality are discussed with the aid of mass balance models. An extensive review of measurement systems, including a listing of numerous instruments with their performance specifications was conducted. Design considerations are discussed for two types of studies--applied research in indoor air quality and investigations of building-associated problems. A systematic approach for developing the design is also described.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB83-264465/NAC, price: $22, or contact Lance A. Wallace, Office of Monitoring Systems and Quality Assurance, U.S. Environmental Protection Agency (RD-680), 401 M Street, S.W., Washington, DC 20460.

How Synfuels Behave in Gas Turbines: Combustion products can be different from those of petroleum-based fuels
See 0338

0404 Industrial Waste Exchanges: Industrial wastes of one company can be a valuable resource to another
Department of Energy, Washington, DC.
Dec 84 *(C, D, G)*

Industrial waste exchanges are facilities that enable industrial process wastes, byproducts, surpluses, or materials that do not meet manufacturing specifications to be transferred from one company to another that can utilize these 'wastes' as process inputs. Benefits of such exchanges are avoided disposal costs for the donating company and reduced energy and dollar costs for raw materials for the receiving company. A report was published that describes how such exchanges work, gives examples of possible energy and monetary savings, discusses impediments to successful operation, and gives recommendations for overcoming these impediments..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-004423/NAB, price code: A03. For information not in the report, contact: Dr. L. Gaines, Argonne National Laboratory, 9700 South Cass Avenue, Argonne, IL 60439; (312) 972-5635.

An Instrument for the Investigation of Particle Fluxes In Marine and Fresh Waters
See 0499

0405 Ion Chromatography Monitors Environmental Waters: New technique provides rapid results with high accuracy
Department of Energy, Washington, DC.
May 84 *(J, K)*

Analysis of fluoride, chloride, nitrate, and sulfate anions in environmental waters can now be made with comparable accuracy in one-sixth the time required by currently accepted methods. The four wet chemical tests now prescribed by the Environmental Protection Agency for measuring these anions could be replaced with a single application of ion chromatography. The technique utilizes a combination of ion-exchange chromatography, eluent suppression, and conductimetric detection. The anions are first separated with a (HCO3(-)/CO3(-2) eluent in an anion-exchange column, then converted to their hydrogenated form in a cation-exchange column. The ion-chromatography technique takes only 15 min per sample and requires less sample preparation.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-021533, price code: A02. For information not provided in the report, contact R. Merriweather, Oak Ridge Gaseous Diffusion Plant, P.O. Box X, Oak Ridge, TN; (615) 576-2309.

0406 Landfill Gas Recovery: Existing and proposed methodologies for the recovery of methane from landfills are surveyed
Department of Energy, Washington, DC.
Apr 84 *(C)*

A report on the state of the art of landfill gas recovery includes mathematical models, design criteria and construction details for eight existing recovery sites and potential alternative systems for optimizing the recovery. There are several mathematical models for predicting gas-production and flow rates. The most promising alternative involves the construction of permeable corridors around the exhaust wells and throughout the landfill to enhance the recovery.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-003261, price code: A06. For information not provided in the report, contact Michael L. Wilkey, Gas Research Institute, 8600 W. Bryn Mawr, Chicago, IL 60631; (312) 399-8321.

Liquid Pathway Dose Calculations (LADTAP2)
See 0866

0407 Longwall Coal Mine Respirable Dust Sources

Department of the Interior, Washington, DC.
Oct 84 *(D)*

A project was undertaken to identify specific sources and the relative levels of contribution of various components of longwall shearer operations to the total airborne respirable dust generated during mining. As a result of dust measurements, the gage cutters were determined to be the major dust-generating source on the shearer. The investigation results lead to the following recommendations: The coal should be cut with a wide web to minimize dust. The inefficiencies of the clearance ring cutters should be reduced by minimizing the number of gage cutters on the end ring.

FOR ADDITIONAL INFORMATION: Contact: Richard C. Olson, Bureau of Mines, Twin Cities Research Center, 5629 Minnehaha Avenue South, Minneapolis, MN 55417; (612) 725-4585. Refer to Sheet 204/TN.

0408 Low-Temperature Reactions for Waste Disposal: Toxic wastes can be made with low energy expenditure and small capital investment

Army Materiel Development and Readiness Command, Alexandria, VA.
Jan 84 *(J)*

A computer-controlled thermogravimetric method was developed for investigating thermal reactions. The new method is needed for the study of low-temperature conversion of surplus hazardous compounds to less toxic compounds. The method is based on the concept that complex, toxic molecular structures can be converted to simpler, less toxic products by application of minimal thermal energy. A report was prepared for the U.S. Army Armament Research and Development Command. Experiments with 50 pesticides demonstrated that the computer-controlled system can detect and isolate reactions for kinetic measurements in about 75 percent of these compounds..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A117309, price code: A02, or contract project officer Wendel J. Shuely (301) 278-3677.

Making Food From Sawdust
See 0027

0409 Managing Coal-Combustion Wastes: A variety of options is explored in a guidebook

Department of Energy, Washington, DC.
Feb 84 *(C, D)*

A report summarizes modifications and practices affecting the disposal, utilization, and recovery of coal-combustion wastes under the Resource Conservation and Recovery Act (RCRA) regulations. A primary concern of the power industry is the quantity and characteristics of ash and sludge to be disposed in the future and the potential of their being declared hazardous under the RCRA legislation. The report is organized into five major groupings: Coal cleaning, Selected power-plant modifications, Utilization options, Scrubber-sludge stabilization and fixation, and Resource-recovery options. The report concentrates on waste-disposal cost, energy impacts, regulatory problems, handling properties, and hazard potential.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-001840, price code: A11.

0410 Mathematical Model of Electrostatic Precipitation for the Texas Instruments Programmable 59 Calculator

Environmental Protection Agency, Washington, DC.
Jul 84 *(D)*

A version of EPA's electrostatic precipitator (ESP) model suitable for use on a Texas Instruments Programmable 59 (TI-59) hand-held calculator has been prepared. This version of the model allows calculation of the ESP collection efficiency, including corrections for non-ideal effects and rapping reentrainment in five size bands. Program input data and the individual and total collection efficiencies are printed on a TI Thermal Printer. This model is described in detail including program steps for its use. This version and a full-scale model are compared.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB83-261669/NAC, price code: A07, or contact Leslie E. Sparks, Industrial Environmental Research Laboratory, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711.

Methods for Determining the Location of Abandoned Wells
See 0920

0411 Mobile System for Extracting Spilled Hazardous Materials from Excavated Soils

Environmental Protection Agency, Washington, DC.
Aug 84 *(D)*

A technique was evaluated for the scrubbing or cleansing of excavated soils contaminated by spilled or released hazardous substances. Laboratory tests were conducted with three separate pollutants (phenol, arsenic trioxide, and polychlorinated biphenyls (PCB's)) and two soils of significantly different character. The tests show that scrubbing of excavated soil on site is an efficient approach for freeing soils of certain contaminants but that the effectiveness depends on the washing fluid (water + additives) and on the soil composition and particle-size distribution.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB84-123637/NAC, price: $11.50, or contact John E. Brugger, Municipal Environmental Research Laboratory--Cincinnati, U.S. Environmental Protection Agency, Edison, NJ 08837.

0412 Model Developed To Simulate Dredged Material Movement

Department of the Army, Washington, DC.
May 84 *(D)*

A three-dimensional mathematical hydrodynamic model for simulating the dispersion of dredged material from aquatic disposal sites has been developed. The model has been calibrated and verified. This model is applicable to any need for accurate predictions of sediment erosion and deposition in any aquatic environment.

FOR ADDITIONAL INFORMATION: Contact: Dr. Richard Peddicord, Environmental Laboratory, U.S. Army Engineer Waterways Experiment Station, P.O. Box 631, Vicksburg, Mississippi 39180; (601) 634-3767.

0413 Modeling Landfill Methane Recovery: Two- and three-dimensional computer simulations are used for the analysis of gas recovery in landfills

Department of Energy, Washington, DC.

Apr 84 *(C, D)*

Mathematical models provide an analytical base for designing operating procedures to recover methane from landfills. Methane recovery controls the hazards associated with methane migration and provides financial potential. Unlike typical manufacturing processes, landfill gas recovery is a one-shot operation with minimal control after initiation. Mathematical modeling allows for the optimization of the process to ensure maximal production. The two- and three-dimensional computer simulations employ equations for diffusional and forced gas flow through a porous media. The numerical finite-differences method is used to solve these transport equations with a variety of boundary conditions, depending on the application.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-013223, price code: A06. For information not provided, contact Michael L. Wilkey, P.E., Gas Research Institute, 8600 W. Bryn Mawr, Chicago, IL 60631; (312) 399-8321.

0414 A Modular Transportable Process Development Unit For Wastewater Treatment Polishing Studies

Department of Energy, Washington, DC.

Feb 84 *(D)*

A modular transportable process development unit (PDU) for R&D studies on wastewater treatment polishing processes was designed and constructed. This PDU contains modules for feed pretreatment and storage, carbon adsorption, reverse osmosis, and ozonation. The nominal aqueous throughput is 60 mL/s, and the unit processes can be operated singly or in any series combination. The PDU is housed in two 40-ft- long semi-van trailers, which can be transported to and operated at any site. The PDU can be used to perform treatability studies with wastewater polishing processes on nearly any wastewater currently being discharged. Results of tests conducted will be of interest to developers of wastewater treatment systems for coal combustion or coal conversion plants. Patent action is being considered.

FOR ADDITIONAL INFORMATION: Contact: D. W. Jared, Oak Ridge National Laboratory, P.O. Box X, Oak Ridge, TN 37830; (615) 574-4192. Refer to 466/X/TN.

0415 Monitoring the Thickness of Coal-Conversion Slag: Proposed technique adapts analogous ocean-floor-mapping technology

National Aeronautics and Space Administration,
Washington, DC.

Oct 84 *(K)*

Existing ocean-floor acoustic technology could be adapted for real-time monitoring of the thickness and viscosity of flowing slag in coal-conversion processing. The technique, known in marine applications as chirp sonar, involves timing the transmission of a shaped acoustic signal through an acoustical conductor and the return of the reflected signal from the slag surface. The proposed sensor is a Y-shaped ceramic rod with the common end flush with the internal surface of the slag tap and the two branches bonded to electrostrictive driver and receiver crystals. The spread of frequencies in the processed return signals is an indicator of the thickness of the material on the tap end of the rod.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15371/TN.

0416 A Multifuel, Low-Emission Gas Turbine: Variable-area air injector improves efficiency at all power levels

Department of Energy, Washington, DC.

Apr 84 *(F)*

A rich/quench/lean combustor for a gas turbine has been designed and tested on a variety of fuels, including heavy petroleum residuals, petroleum distillate, and low-heating-value gas. The combustor performed satisfactorily on all the fuels tested, producing low nitrogen oxide emissions while operating at high efficiency. For both liquid and gaseous fuels, the combustor demonstrated an insensitivity to fuel-bound nitrogen levels. The combustor demonstrated the advanced technology required for a fuel-tolerant, durable, low-emission turbine for utility and industrial applications. The combustor consists of an initial rich-burning zone followed by a quench zone and a lean reaction and dilution zone.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-001398, price code: A02. For information not provided in the report, contact Warren W. Bunker, U.S. Department of Energy, FE-22, Washington, DC 20545; (301) 353-2824.

Multifunctional Sensor Electrode

See 0532

Multiple-Compartment Dosimeter: Radiation dose is measured at various depths

See 0869

0417 New Insights Into Recirculating Bed Reactors: Coal mixer modeling and coal hydrodesulfurization are examined

Department of Energy, Washington, DC.

Apr 84 *(C, D)*

A report examines two aspects of the recirculating-bed-reactor (RBR) technology. The first is mixing processes at the coal injector point. Quantitative information about these processes can help researchers verify whether the RBR can accomodate agglomerating coals without pretreatment. The second is coal hydrodesulfurization. Hydrodesulfurization is similar in practice to hydrogasification except that it emphasizes maximizing the yield of low-sulfur fuel for pulverized-fuel boiler consumption, instead of maximizing the methane yields. This process holds promise for the simplified cleaning of coal-derived fuels. Extensive appendixes in the report discuss the test equipment characteristics in great detail. The information is supplemented with a number of performance tables and graphs.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: FE-2449-11, price code: A20.

0418 New Treatment Has Been Developed For Tannery Waste Water Containing Sulfides

Department of Agriculture, Washington, DC.

Jan 84 *(D)*

Scientists have developed a new treatment for tannery wastes containing toxic sulfide. The new treatment may offer leather tanneries and other industries a cheaper way to meet 1985 Federal water pollution limitation guidelines. The experiment was conducted in an anaerobic, oxygen-free, reactor designed by a team of researchers at the Agricultural Research Service's Eastern Regional Research Center (ERRC). A team found that microbes could aggressively degrade a diet of tannery waste without the aid of oxygen as an energy source. However, the researchers also found that their microbes could generate methane in spite of the high levels of sulfide normally found in this waste. The results helped the team reverse a prevailing theory of industrial waste disposal, namely that anaerobic organisms cannot produce methane in the presence of sulfides. The primary achievement of the ERRC team is that their new anaerobic treatment system is potentially less expensive to construct and operate than the larger, aerobic systems which are now commonly used to treat tannery waste. The laboratory experiment has been scaled up to a 100-gallon pilot plant.

FOR ADDITIONAL INFORMATION: Contact: Dr. David Bailey at (215) 489-6515.

Noise Control in Propeller-Driven Aircraft: Double-wall sidewalls minimize interior noise and weight
See 0015

0419 Numerical Models of Water Quality Conditions Are Developed

Department of the Army, Washington, DC.
Aug 84 *(D, J)*

A number of state-of-the-art numerical models of water quality conditions in both reservoirs and rivers are undergoing development and evaluation. In the reservoir area, both one-dimensional (1-D) and two-dimensional (2-D) models are being developed and evaluated. For riverine applications, a series of models are being constructed and/or evaluated, including both 1-D and 2-D, steady-state and dynamic models. These models are appropriate for evaluating water quality impacts of a variety of human activities, including reservoir and waterway project design and operation, point and non-point sources of pollution.

FOR ADDITIONAL INFORMATION: Contact: Mr. Mark S. Dortch, U.S. Army Engineer Waterways Experiment Station, P.O. Box 631, Vicksburg, MS 39180, (601) 634-3517.

Occupational Health Information System Developed
See 0878

The Ocean Pollution Data and Information Network (OPDIN)
See 0944

Oil Burner With Nearly Stoichiometric Combustion: A method of vaporizing and mixing the fuel increases the thermal efficiency to 84 percent
See 0167

0420 Oil Recovery Enhancement With Paper Pulp Wastes

Department of Energy, Washington, DC.
Jan 84 *(C)*

Loss of surfactants used for enhanced oil recovery is a major problem because of the high cost of the surfactants and the necessity of maintaining surfactant concentrations sufficient to affect recovery. Surfactant losses occur as a result of adsorption on minaerals or by precipitation when they are injected into oil wells to recover additional oil. Lignosulfonates, a by-product of pulping of wood by the sulfite process, have been proposed previously as competing agents to reduce loss. It was found that substances from the dominant kraft pulping process appear equally useful for this purpose. Those which are most effective are the caustic extract from bleaching operations, the spent digestion solution ('weak black liquor'), and sodium saccharinates. These are wastes or low-valued by-products. Evaluation has been by measurement of adsorption of typical petroleum sulfonates or other surfactants on clays and sandstones, including some from oil fields. Surfactant loss on contact with minerals typically was reduced by two-thirds and, in some cases, by a factor of ten by pretreatment of the minerals with dilute solutions of the competitive adsorbates. These by-products can be used as preflush constituents or additives to surfactant banks in micellar flooding. U.S. Patent (4,313,500) has been issued.

FOR ADDITIONAL INFORMATION: Contact: D. W. Jared, Oak Ridge National Laboratory, P.O. Box X, Oak Ridge, Tennessee 37830, (615) 574-4192. Refer to 464/XTN.

0421 Oily Sludges: A Physical Characterization

Department of the Navy, Washington, DC.
Apr 84 *(J)*

Changing conditions make it necessary for the Navy to know more and more about the waste materials disposed of. One of these is oily sludge. A protocol for the physical analysis of oily sludge was developed in negotiating with contractors for hauling, cleanup, and disposal of oily sludges. Oily sludges are complex, multiphase compositions of matter and contain various chemical species in volatile, liquid, and solid physical states. Legal and environmentally sound approaches to the ultimate disposal of oily sludge require a clear understanding of the nature and amount of this toxic residue. A protocol was developed for the physical analysis of oily sludge. It provides for the determination of the following components: Solid Phase (amount of organic solids, amount of inorganic solids); Liquid Phase (water content, free oil content, dissolved oil content); and Volatile Phase.

FOR ADDITIONAL INFORMATION: Contact: Leslie A. Karr, Naval Civil Engineering Laboratory, Code L54, Port Hueneme, CA 93043; (805) 982-4191.

Optical-Fiber Dosimeter: Portion of red-to-blue light spectrum transmitted indicates radiation dose
See 0543

Optimization of Liquid-Liquid Extraction Methods for Analysis of Organics in Water
See 0121

0422 Packaging Nuclear and Chemical Waste for Disposal: Waste would be encapsulated in hollow silicon spheres

National Aeronautics and Space Administration, Washington, DC.
Nov 84 *(D)*

In a proposed method, nuclear and chemical waste would be quickly encapsulated in hollow silicon spheres by forming, filling, and sealing the sphere. The process can be entirely automated. As the glass spheres are formed by nozzles they are filled by a pulsing injection of the waste material. The glass spheres then seal themselves and drop from the nozzles into a contactless coating facility where a lead coating is applied. After coating with lead, an additional coating of molten glass is applied to protect the lead coating. An alternate procedure is to incorporate lead in the glass-formation step, thus forming lead/glass spheroids. After cooling, the spheres roll down a channel to be packaged in a primary container for storage.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for the commercial use of this invention should be addressed to Paul F. McCaul, NASA Resident Office-JPL, Mail Code: 180-601, 4800 Oak Grove Drive, Pasadena, CA 91103; (213) 354-2700. Refer to NPO-15454/TN.

A Portable Radiation Monitor: Battery-operated monitor detects and identifies radiation on site
See 0547

Predicting Aircraft Noise Levels: Program predicts noise levels from data on fan, combustor, turbine, and airframe sources
See 0017

0423 Process for Removing Heavy Metal from Water is Developed

Department of Agriculture, Washington, DC.
Dec 84 *(D)*

The use of insoluble starch xanthate as a means to capture dissolved heavy metal cations present in industrial wastewater was developed at the U.S. Department of Agriculture, Northern Regional Research Center. Insoluble starch xanthate is a water insoluble grain based product which gives up sodium and magnesium ions in exchange for heavy metal cations. This exchange takes place when the insoluble starch xanthate comes into contact with the heavy metal cations present in industrial process wastewater. Insoluble starch xanthate is an anionic polymer, is low in cost, and does not require capital intensive facilities for water decontamination applications. The starch xanthate technology is effective for the removal of silver, gold, cadmium, cobalt, chromium, copper, iron, mercury, manganese, nickel, lead, tin, and zinc from industrial wastewater or other effluent discharge. This decontamination technique is also effective for removal of combined heavy metal cations from wastewater. Heavy metal removal can be accomplished using application techniques which include batch processing, continuous flow processing, and filtering.

FOR ADDITIONAL INFORMATION: Contact: TECTRA fact sheets, School of Business and Public Administration, California State University, Sacramento, CA 95819; (916) 454-6640. Refer to TECTRA Case M16-01/TN.

Quieted Hand-Held Percussion Drills
See 0927

0424 Rapid Assessment of Potential Ground-Water Contamination Under Emergency Response Conditions

Environmental Protection Agency, Washington, DC.
Aug 84 *(D)*

A manual provides a methodology for estimating potential ground water contamination under emergency response conditions at abandoned hazardous waste or toxic chemical spill sites. It is designed for use by field personnel who must estimate quickly how contaminant concentrations change with time and distance from an emergency response site. The procedures include evaluation of critical contaminant and site characteristics as input to an assessment methodology for analyzing the fate and movement of chemicals through both the unsaturated and saturated (i.e., ground water) soil zones. A graphical technique (nomograph) has been developed as an integrated methodology for assessing contaminant movement through both the unsaturated and saturated (ground water) zone. Guidelines for evaluating critical waste and site characteristics are provided to allow estimation of needed nomograph parameters.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB84-133123/NAC, price: $16.00, or contact Lee A. Mulkey, Environmental Research Laboratory, U.S. Environmental Protection Agency, College Station Road, Athens, GA 30613.

0425 Recycling Lithium Carbonate/Lithium Hydroxide Waste: A hazardous-waste disposal problem is eliminated by regeneration

National Aeronautics and Space Administration, Washington, DC.
Mar 84 *(D, J)*

A proposed chemical process would recycle the Li2CO3/LiOH waste mixture produced when LiOH absorbs CO2 from the air (as in systems that maintain breathable atmospheres). The regeneration process would eliminate the need to dispose of the caustic waste and would use less energy than simple calcination of the entire waste mass. The process has been partly verified on a laboratory scale. It may be generally applicable in that the relative insolubility of carbonates in saturated aqueous solutions of the corresponding hydroxides is a general property of the alkali metals.

FOR ADDITIONAL INFORMATION: Inquiries concerning rights for the commercial use of this invention should be addressed to James O. Harrell, John F. Kennedy Space Center, Mail Code: SA-PAT, Kennedy Space Center, FL 32899; (305) 867-2544. Refer to KSC-11261/TN.

Reducing Aircraft-Engine Noise: Shock structure is modified to eliminate the associated noise
See 0172

0426 Reducing Soot in Diesel Exhaust: Electrically charged fuel improves oxidation

National Aeronautics and Space Administration, Washington, DC.
Nov 84 *(D)*

A proposed fuel-injection system would reduce the amount of soot formed in diesel engines. A spray injector electrically charges the fuel droplets as they enter the cylinder. The charged droplets repel each other, creating a dilute fuel mist that is easily penetrated by the oxygen in the cylinder. This encourages more complete combustion and hinders soot formation. A mathematical model describes the expansion of the cloud of identically charged droplets. The required electrical power has been computed in terms of the fuel, spray, and engine characteristics.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15715/TN.

0427 Removal and Recovery of Silver From Photographic and Photoreproduction Effluents

Department of Energy, Washington, DC.
Jan 84 *(D, G, J)*

Several processes have been developed for removal and recovery of silver from photographic and photoreproduction effluents. In one method for silver removal from spent photographic fixer, the principal complexing agents for silver, thiosulfate and sulfite ions, are destroyed by addition of fixer to alkaline hypochlorite solution and the oxidation-reduction potential is monitored. Subsequently, precipitated silver chloride and dissolved silver are converted to silver metal by addition of hydrazine monohydrate. Silver is recovered easily by filtration, and the remaining effluent contains < 0.5 mg/L of dissolved silver and has substantially reduced BOD and COD. In an alternative process, ammoniacal dithionite solution is used for direct precipitation of silver from spent fixer. A pilot plant (about 800-L capacity) for silver recovery from photoreproduction developer and developer rinse is in operation. These processes should be useful for both large and small photographic and photoreproduction installations where silver recovery and conditioning of effluents before discharge is desired.

FOR ADDITIONAL INFORMATION: Contact: D.W. Jared, Oak Ridge National Laboratory, P.O. Box X, Oak Ridge, TN 37830; (615) 574-4192. Refer to 463/XTN.

0428 Removing PCB's From Oils: Contaminated oil can be cleansed and recycled, and the PCB's disposed of in the prescribed manner

Department of Energy, Washington, DC.
Jun 84 *(D)*

Polychlorinated biphenyls can be removed from such used petroleum products as lubrication oil or transformer oil by a process in which the oil is contacted with methanol. The methanol absorbs part of the PCB content, is distilled so that it leaves the PCB behind, and is recycled so that it absorbs additional PCB from the oil. Since PCB's are much more soluble in oil than in methanol, they cannot be removed in a single step. However, they can be removed efficiently by a batch process in which the methanol solvent is repeatedly removed from and readded to the oil.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,387,018 which is available from: Commissioner of Patents, Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, US DOE, Washington, DC 20585. For further information, contact: Gus T. Cook, Union Carbide Corporation, Paducah Gaseous Diffusion Plant, P.O. Box 1410, Paducah, KY 42001; (502) 444-6311, Ext. 293.

Renewable Energy for Industry: Guidance is given for evaluating and financing biomass, waste, solar, and wind sources
See 0365

Resonance Ionization Mass Spectrometry
See 0131

Retort Utilizes Oil-Shale Fines: Additional energy is extracted, and waste disposal is simplified
See 0929

0429 Safe Disposal of PCB Waste: A variety of disposal technologies are assessed

Department of Energy, Washington, DC.
Apr 84 *(D)*

Technologies for safely disposing of polychlorinated biphenyls (PCB's) were studied. Several technologies are being developed by private industry and government to meet environmental regulations. These include a sodium naphthalide system, a sodium-amine method, a sodium-polyethylene glycol process, plasma-arc, ultraviolet-ozone, catalyzed wet oxidation, hydrothermal destruction, and filtration with chemical sponges. These technologies are assessed.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-013715, price code: A04. For information not in the report, contact Dr. Vincent J. DeCarlo, U.S. Department of Energy, EP-32, Washington, DC 20545; (301) 353-5684.

Scrubber in Blowing Section Offers Good Ventilation Taking 50 Foot Cuts
See 0930

0430 Simplified Procedures Have Been Developed for Calculating Chemical Doses for Water Stabilization

Department of the Army, Washington, DC.
Jul 84 *(D, J)*

Water produced at a drinking water treatment plant should not only be safe but should be stable (i.e., non-corrosive and non-scaling). Previously, chemical dose could be determined by trial-and-error using indicies after the fact, or using complicated equilibrium diagrams. Research produced an easy-to-use set of nomograms and a microcomputer program, either of which can be used by plant operators or designers to quickly determine chemical feed rates.

FOR ADDITIONAL INFORMATION: Contact: Thomas M. Walski, WESEE-R, U.S. Army Engineer Waterways Experiment Station, P.O. Box 631, Vicksburg, Mississippi 39180; (601) 634-3931.

0431 Simulating Transportation and Storage in Coal Refining: Computer model analyzes hypothetical situations and highlights problems

Department of Energy, Washington, DC.
Oct 84 *(C, D)*

A demonstration plant for converting high-sulfur bituminous coals into environmentally acceptable solid and liquid fuels can be analyzed as an integrated production, storage, and distribution system with the aid of a general-purpose computer-simulation model. The model is composed of four modules, representing the plant, storage tanks, loading and unloading stations, and the distribution network.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-007989/NAB, price code: A21. For information not in the report, contact: Joseph F. Daly, SRC-1 Project Manager, U.S. Department of Energy, P.O. Box 2752, Allentown, PA 18001; (215) 481-1333.

0432 Solar Drying of Sludge: Greenhouse Versus Open Bed: The protection greenhouses afford against rain may not be necessary

Department of Energy, Washington, DC.
Apr 84 *(D)*

Whether greenhouses are cost-effective for drying sludge depends on the locality. A recent study for the city of Albuquerque showed that it would be more economical to dry sludge in the open because of the abundant sunshine and low precipitation in that region. In 12 of 25 other cities studied, however, greenhouse drying may be attractive because the amount of water gained in an open bed by precipitation may exceed that lost by evaporation. The cities include Boston, Seattle, and Lake Charles, Louisiana.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by order-

ing the NTIS report, order number: DE82-015830, price code: A03. For information not in the report, contact James Hedstrom, Los Alamos National Laboratory, M.S. K571, Los Alamos, NM 87545; (505) 667-2621.

0433 Standardized Procedures for Planting Vegetation on Completed Sanitary Landfills

Environmental Protection Agency, Washington, DC.

Mar 84 *(D)*

A manual was developed for those charged with establishing a vegetative cover on completed landfills. Special problems associated with growing plants on these sites are discussed, and step-by-step procedures are given for converting a closed landfill to a variety of end uses requiring a vegetative cover. Instructions are given for vegetating landfills with either limited or adequate funds. A hypothetical case of landfill conversion is also included.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB83-241018, price code: A03 or contact Robert E. Landreth, Municipal Environmental Research Laboratory, U.S. Environmental Protection Agency, Cincinnati, OH 45268.

Standards For Toxic Metals In Human Urine Are Developed

See 0133

Submarine Air Monitoring System Improved

See 0564

0434 Sulfur Dioxide Concentration Analysis From Multiple, Randomly Varying Sources

Department of Energy, Washington, DC.

Jan 84 *(D)*

A technique for realistic prediction of violations of air quality standards from multiple-emission sources is presented. The method allows that sulfur dioxide emission rates to vary randomly and, thus, incorporates the emissions variability that actually occurs as a result of the variability in the sulfur content of coal and the general variability in power plant operations. A modified version of the RAM model is used as the basic dispersion model in this technique. The RAM results are analyzed statistically using a cumulative distribution function for the source strength to predict the potential for violations of predetermined air quality standards. This technique allows objective examination of impacts of a proposed action and the effectiveness of varying levels of pollution control. A plant operator can match the preferred combination of sulfur content mean and variability with the necessary level of control to comply with air quality regulations. A computer program is available upon request. This technique is relevant to the work of environmental analysts and planners in assessing regional impacts of sulfur dioxide emissions to the atmosphere and developing and evaluating pollution abatement strategies.

FOR ADDITIONAL INFORMATION: Contact: D.W. Jared, Oak Ridge National Laboratory, P.O. Box X, Oak Ridge, TN 37830; (615)574-4192. Refer to 462/XTN.

0435 Surrogate Hazardous Wastes May Simplify Incinerator Monitoring

Department of Commerce, Washington, DC.

Jun 84 *(D)*

A few innocuous tracers used as surrogate hazardous materials could relieve operators of hazardous waste incinerators from much of the expensive complexity of being prepared to detect and analyze a wide variety of possible hazardous compounds in the waste they burn. Use of these surrogate markers could be cheaper, simpler and more accurate than present methods of checking the performance of waste incinerators, heat-recovery plants, and similar installations, according to NBS researchers. A major problem in burning hazardous waste mixtures has always been how to verify that the hazardous components of the mixture are in fact being destroyed. One possible solution, NBS scientists suggest, is to pick appropriate tracer compounds that are known to be more difficult to destroy than any likely hazardous constituents in the waste mixture.

FOR ADDITIONAL INFORMATION: Contact: Dr. Hing Tsang, U.S. Department of Commerce, National Bureau of Standards, Center for Chemical Physics, Washington, DC 20234; (301) 921-2775.

0436 Three New Techniques for Floating Pollutant Spill Control and Recovery

Environmental Protection Agency, Washington, DC.

Aug 84 *(D)*

Three new techniques were investigated for controlling and recovering oil and floating hazardous material (HM) spills in water bodies: amine carbamate gelling agents, fluorescent agents for nighttime operations, and environmental sonic sensing. The last two methods are aimed at solving the serious problems posed by the poor visibility that often accompanies spill situations. Amine carbamate gelling agents can be used to gel oil and floating HM spills quickly and completely to a solid consistency. Cheap, nontoxic, and highly efficient fluorescent agents can be applied in low (50 ppm) concentrations onto spill areas to aid night visibility. Underwater sonic sensing techniques were shown to be excellent means of locating near-surface pollutants.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB84-123694/NAC, price: $16.00, or contact Uwe Frank, Municipal Environmental Research Laboratory--Cincinnati, U.S. Environmental Protection Agency, Edison, NJ 08837.

0437 Three-Zone Catalyst Resists Sulfur Poisoning: Zone configuration and composition increase efficiency

National Aeronautics and Space Administration, Washington, DC.

Oct 84 *(D)*

A three-zone catalyst bed uses different types of nickel catalysts to convert sulfur-containing hydrocarbon fuels to hydrogen and carbon monoxide. The zones are designed to achieve the conversion with a minimal residue of unconverted hydrocarbon, no soot, and minimal sulfur contamination. The first zone allows the reaction of fuel with air on the nickel catalyst while maintaining inlet heat requirements and producing enough hydrogen to prevent sulfur from deactivating the catalyst. The second zone continues the air-oxidation reaction and initiates the steam-hydrocarbon reaction. The third zone provides enough activity and surface area to complete the steam reforming reaction.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-14827/TN.

0438 Tiny Radiation Warning Devices: Miniature radiation warning device that enhances nuclear industry worker safety

Department of Energy, Washington, DC.
Mar 84 *(E, K)*

Active electronic instruments that warn of radiation exposure are called chirpers and give workers continuous indication of radiation exposure. The chirper indicates radiation exposure by the number of chirps given off per minute. The number of chirps increases as the exposure level goes higher. Two different chirpers have been developed, each weighing only 1.2 oz., that can be conveniently clipped to a shirt collar. While packaged the same, one variety uses a CdTe solid-state radiation detector, while the second uses the well-known Geiger-Muller (GM) detector. Both fill a current personnel monitoring instrumentation need in the nuclear industry.

Totally Optical Technique for Monitoring Ambient Non-Methane Hydrocarbons
See 0576

0439 Treating Wastewater From Coal Liquefaction: Treatment process reduces pollutant concentrations below EPA levels

Department of Energy, Washington, DC.
Dec 84 *(D)*

As part of an overall environmental evaluation of a process for converting coal into hydrocarbon liquids, such as gasoline and fuel oil, sour water treatability studies have been performed. The studies indicate that the sour water can be treated successfully for reuse or for discharge to public waters. A pilot-plant process employing powdered activated carbon and wet-air regeneration of the carbon was used to treat the wastewater from coal liquefaction.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-006712/NAB, price code: A06. For information not in the report, contact: James A. Reafsnyder, U.S. Department of Energy, Oak Ridge Operations Office, P.O. Box E, Oak Ridge, TN 37831; (615) 576-1051.

0440 Treatment of Plating Wastewater: A survey of treatment practices shows need for uniformity and improvements

Army Materiel Development and Readiness Command, Alexandria, VA.
Jun 84 *(D)*

A report describes the similarities and differences in the treatment of plating wastewater at U.S. Army installations. Subjects discussed include metals plated, volumes of wastewater flow, and efficiency of operations. Similarities are noted in basic treatment methods, in lack of recycle and recovery systems, and in problem areas. The report is based on a survey conducted for the U.S. Army Mobility Equipment Research and Development Command.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A125230, price code: A04.

0441 Turning Wastes Into Resources: Report describes innovative improvements in sewage management

Department of Energy, Washington, DC.
Dec 84 *(C, D)*

Managers of municipal sewage systems have an opportunity to explore some energy-conserving sewage-treatment processes in a recently published report. Results of these projects can offer a fresh perspective to companies and communities faced with a problem of energy costs that inevitably increase with the growing volume of sewage.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-015398/NAB, price code: A03.

Viewer Makes Radioactivity Visible: A battery-operated viewer could aid in contamination surveys and medical diagnoses
See 0585

0442 Waste Disposal at Synthetic-Fuel Plants: Disposal is examined from engineering, environmental, and economic viewpoints

Department of Energy, Washington, DC.
May 84 *(C, D)*

Research examined solid-waste-disposal options at synthetic-fuel plants. The report is based on a study of the Northeast-Appalachian region of the United States and covers three technologies for the production of synthetic fuel from coal: solvent refining, slagging gasification, and dry-ash gasification. The focus is the disposal of both hazardous and nonhazardous wastes by landfill. The report provides background on the synthetic-fuel technologies and the major characteristics of the waste streams that must be accommodated. It discusses the rudiments of landfill design, site preparation, liners, and covers. Estimates of leachates are calculated.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-012292, price code: A06. For information not provided in the report, contact Dr. Vincent J. DeCarlo, U.S. Department of Energy, EP-32, Washington, DC 20545; (301) 353-5684.

0443 Waste Oils Fuel Navy Boilers

Department of the Navy, Washington, DC.
Jun 84 *(C)*

The Naval Civil Engineering Laboratory (NCEL), Post Hueneme, Calif., has developed use for waste oils--as a supplemental fuel in Navy boilers. A handbook provides information for a variety of users at different levels of management and operation. It contains background information on various sources of waste oil. There are procedures for operators who use waste oil as boiler fuel, including procedures for handling, pre-burning treatment, burning methods, equipment modifications, and operational requirements. The final portion of the report consists of a comprehensive survey of the potential for using waste oil and a compilation of the reported experience of waste oil users.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer Fact Sheet, Code E411, Naval Surface Weapons Center, Dahlgren, Virginia 22448. Refer to 090104/TN.

0444 Wastewater Treatment with Plants in Nutrient Films

Environmental Protection Agency, Washington, DC.
Apr 84 *(D)*

The use of plants in wastewater treatment has most often been limited to slow rate land treatment and the use of nuisance plants of limited value in hydroponic systems. A simple advanced hydroponic system referred to as the 'Nutrient Film Technique' (NFT) enables all species of plants to be considered for use in water pollution control systems. The technique has been shown to be a viable alternative for domestic sewage treatment in a 3-year multidisciplinary effort. Pilot scale units up to 36 meters long have been operated continuously with domestic sewage at flow rates of up to 11,000 l/d in New York and New Hampshire.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB83-247494, price $44.50. or contact W. R. Duffer, Robert S. Kerr Environmental Research Laboratory, U.S. EPA, Ada, OK 74820.

0445 Wet Oxidation and Ozonation of Specific Organic Pollutants

Environmental Protection Agency, Washington, DC.

Apr 84 *(D)*

Research was undertaken to assess the applicability of wet oxidation and ozonation to the treatment of wastewater containing five specific pollutants typical of the 114 organic compounds included on the EPA priority pollutant list. The pollutants, phenol; 2-chlorophenol; 4-nitrophenol; 1,2-dimethylphthalate and 1,2-dichloroethane were selected for study on the basis of their occurrence, structure, water solubility, and volatility. A detailed economic evaluation of this process indicated that an investor's interest rate of 20 percent could be attained at a treatment charge of $69 per 1000 gallons.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB83-254060, price: $16.

INSTRUMENTATION & TESTING

0446 Accelerated Solar-UV Test Chamber: Medium-pressure mercury-vapor lamps provide a high ratio of ultraviolet to total power

National Aeronautics and Space Administration, Washington, DC.

Oct 84 *(K)*

A chamber for evaluating solar-ultraviolet (UV) radiation damage permits accelerated testing without overheating the test specimens. It uses a water jacket as a filter for medium-pressure mercury-vapor lamps, which concentrate about three times as much of their total radiation in the UV as do xenon-arc lamps. The chamber allows accelerated UV testing up to 30 Suns with specimen surface temperatures of 85 to 267 F (30 to 130 C).

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15063/TN.

0447 Acoustic Levitation With Less Equipment: Certain chamber shapes require fewer than three acoustic drivers

National Aeronautics and Space Administration, Washington, DC.

Mar 84 *(D, J)*

Most previous work on acoustic levitation has dealt with rectangular chambers. Now, however, calculations and experiments have demonstrated that three-orthogonal-plane levitation is really a special case. More generally, positions of stable acoustic levitation are possible for various simple and complex chamber geometries, such as spherical and cylindrical, and for higher-order multidimensional excitation modes. In a cylindrical chamber, an object may also be levitated using fewer than three acoustic drivers.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15562/TN.

0448 Acoustic-Emission Methods for Composite Materials: Techniques can be used for quality control and nondestructive evaluation

Army Materiel Development and Readiness Command, Alexandria, VA.

Jun 84 *(Acoustic emissions, H, K)*

A state-of-the-art review is available on acoustic-emission methods for characterizing and testing composite materials and structures. Acoustic emission involves the application of acoustic stress waves into the composite material and analysis of the deflections of these waves picked up by the surface-mounted sensors. Such an analysis can provide information on the location and type of any subsurface flaw and inhomogeneity.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A132621, price code: A14, or contact project officer Joe Pratcher (314) 263-3079.

0449 Air Pyrotechnic Signals Are Tested

Department of the Navy, Washington, DC.

Jun 84 *(K)*

A signal firing device to test air pyrotechnic signals has been developed by the Naval Weapons Support Center, Crane, Indiana. A launcher having a barrel and a firing mechanism is actuated by operation of an air cylinder. An operator can control the air cylinder from a remote location thereby minimizing risk of injury from any malfunction of a pyrotechnic signal. Measurement of test parameters is more accurate in that times can now be recorded electronically in lieu of using a stop watch. Additionally, the firing device is versatile in that a number of different type flares can be fired with little or no modification of the testing device.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, Virginia 22448. Refer to: 090103.

0450 Angular Measurements in Gimbal-Mounted Sensors: Fiberoptic lightguide pickoff has good signal resolution and accuracy without disadvantages of mechanical inertial-guidance systems

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 84 *(K)*

The stabilized inertial gimbal that supports sensors, such as millimeter-wave imaging infrared and TV cameras, is able to track targets through the position pickoff that provides the logic indicating the attitude change. In a study conducted for the U.S. Army Missile Command, it was found that laser diodes or light-emitting diodes, optical fibers, and light detectors can be used to measure position angles accurately and save space, weight, and assembly costs in inertial-guidance systems.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A133343/NAA, price code: A02, or contact project officer Aubrey Rodgers (205) 876-3498.

0451 Aqueous Solution Standard Reference Materials Are Being Developed

Department of Commerce, Washington, DC.
Nov 84 *(J, K)*

Laboratories using analytical methods that require aqueous solutions of metallic elements for calibrating instruments, and manufacturers of such solutions, should find a new series of standard reference materials (SRMs) helpful. Developed by the Commerce Department's National Bureau of Standards (NBS), the reference materials are intended for use in atomic absorption spectrometry (AAS), inductively coupled plasma atomic emission (ICP/AES), direct current plasma atomic emission (DCP/AES), and other spectrometric analytical techniques. The first in the series, SRM 2121, released earlier this year, contains cadmium, lead, silver and zinc. Two more reference materials in the series also are available currently: barium, calcium, magnesium and strontium (SRM 2122), just released, and lithium, potassium, sodium and rubidium (SRM 2123).

FOR ADDITIONAL INFORMATION: Contact: Office of Standard Reference Materials, B311 Chemistry Building, National Bureau of Standards, Gaithersburg, MD 20899; (301) 921-2045. To order any of the three available aqueous solution reference materials, specify the SRM number. The price is $160 per unit.

0452 Attitude Control by Localized Outgassing: Reaction forces and torques would be generated by vaporizing material with a laser

National Aeronautics and Space Administration,
Washington, DC.
Mar 84 *(D)*

The orientation of a freely floating object can be controlled by vaporizing material from its surface. In a test, the orientation of a levitated sample in an acoustic chamber was controlled by directing a laser beam or an intense focused light beam at points on the surface of the object. Another test was run under simulated zero-gravity conditions in an airplane. The laser heats the material (such as a glass, metal, or any compound) that will sublime or outgas.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15575/TN.

0453 Bearing Measuring Fixture: Tool increases accuracy and reduces labor

National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(F, K)*

A tool serves an accurate base for making critical measurements of large bearings such as those in turbopumps. The tool is a U-shaped bar 7 inches long. It is bolted to the lower bearing housing on two of the studs that hold the bearing assembly together. A technician takes the bearing measurements with a depth micrometer through a slot in the tool. Previously, two technicians were needed for the measurements.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-19315/TN.

0454 Catalog of Standard Reference Materials

Department of Commerce, Washington, DC.
Jul 84 *(H, J, K)*

A new catalog has been published which lists more than 900 standard reference materials (SRMs) available from the National Bureau of Standards. For more than 75 years, NBS has provided SRMs to scientific, industrial, and commercial users throughout the world. They are used to help improve measurement accuracy by providing a way to calibrate instruments. SRMs, which are well-characterized materials with specific chemical or physical properties certified by NBS, include such items as cements, ores, metals, glass, plastics, foods, and environmental and clinical reference materials. The catalog's format provides quick access to material description, certified characterization, unit size, and type.

FOR ADDITIONAL INFORMATION: Copies of the new NBS Standard Reference Materials Catalog 1984-1985 (NBS-SP 260), are available from the Office of Standard Reference Materials, B311 Chemistry Building, National Bureau of Standards, Washington, DC 20234, (301) 921-2045.

0455 Ceramic 1,500C Test Furnace: Unit is inexpensive, easy to construct, and requires little power to operate

Army Materiel Development and Readiness Command,
Alexandria, VA.
Apr 84 *(D, H, K)*

A design guide is available for the construction of a small furnace for heat-treating or mechanical testing ceramic materials up to 1,500C in air. The guide was prepared for the U.S. Army Materials and Mechanics Research Center. Typical tests that can be performed in the furnace include modulus of rupture in four-point bending, stress rupture in bending, bend-creep testing, and fracture mechanics tests such as double torsion. Total cost for each furnace was under $500, using simple off-the-shelf components.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A125636, price code: A02 or contact project officer George D. Quinn (617) 923-5980.

0456 Charged-Particle Flux Sensor: Improved design has greater collection efficiency

National Aeronautics and Space Administration,
Washington, DC.
Mar 84 *(J, K)*

An improved version of the Faraday cup is expected to increase the accuracy of measurements of the flux density of charged particles (usually electrons or protons). Earlier current collectors of this type were constructed without specific attention to current losses from secondary emission or reflection of the incident particles. Consequently, measurement errors reached as high as 20 to 30 percent. The new sensor traps most of the secondary and reflected primary charged particles, thus assuring nearly complete current collection and accuracy over a wide range of incident flux densities.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. This invention is owned by NASA, and a patent application has been filed. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to Leon D. Wofford, Jr., George C. Marshall Space Flight Center, Mail Code: CC01, Marshall Space Flight Center, AL 35812; (205) 453-0020. In either case refer to MFS-25641/TN.

0457 Circuitry for Angle Measurements: An angle resolver is pulsed and read under microprocessor control

National Aeronautics and Space Administration, Washington, DC.

Dec 84 *(A, B, F, K)*

An electronics package for a shaft-angle measurement system features a resolver, a high-speed data-acquisition system, and a microprocessor. It is suited for such applications as rate tables, robots, antenna direction controllers, and machine tools. The microprocessor triggers the pulse generator, causing it to energize the resolver. The microprocessor then quickly reads the resolver sine and cosine windings with the aid of the data-acquisition system. From the polarities of the sine and cosine voltages, the quadrant is determined, and the complete value of the angle is then known.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for the commercial use of this invention should be addressed to Leon D. Wofford, Jr., George C. Marshall Space Flight Center, Mail Code: CC01, Marshall Space Flight Center, AL 35812; (205) 453-0020. In either case refer to MFS-25825/TN.

0458 Clinical Mass Spectrometers Are Now Available

Department of Health and Human Services, Washington, DC.

Apr 84 *(E, J, K)*

Three mass spectrometers at the University of Colorado Health Sciences Center are available to scientists throughout the United States. The two-year-old Denver facility is only the second of its kind in the country to focus on human health and the diagnosis of disease. The mass spectrometers - one high-resolution and two low-resolution instruments - are used to analyze biocomponents and other naturally occuring components of up to 1,500 atomic mass units (amu). A fourth mass spectrometer, to be operational in early 1984, will measure compounds of twice the mass. At present, the highest resolution machine can detect the mass of a compound to within a few thousandths of an amu. Because biochemical compounds are often difficult to ionize, the center employs a new technique, fast atom bombardment, to help form the necessary ion gas. A specially designed atom gun produces a pencil-thin stream of fast argon atoms, which hits a sample suspended in a drop of glycerol and transfers energy to create an ion gas. With this technique, the structure of biochemical compounds that would otherwise resist analysis can be detected by mass spectrometry.

FOR ADDITIONAL INFORMATION: Contact: Dr. Paul Fennessey, Clinical Mass Spectrometry Resource, University of Colorado, Health Sciences Center, Campus Box C 232, Denver, CO 80262; (303) 394-8196.

0459 Computer Energy Time Unit Devised

Department of the Navy, Washington, DC.

Jul 84 *(C)*

The Naval Underwater Systems Center (NUSC), Newport, Rhode Island, has established a 'unit of production' for an R&D lab. The new Computer Energy Time Unit (CETU) is destined to become the unit of electrical consumption measurement for all R&D labs. The simplicity is remarkable: One CETU equals one megawatt hour of electrical power. This measurement capability has been coupled with an intricate system for measuring and recording the electrical power consumed by computer labs only.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, Virginia 22448. Refer to 080903/TN.

0460 Coolant-Level Sensors for Nuclear Reactors: Proposed sensors detect the loss of coolant at an early stage of an accident

Department of Energy, Washington, DC.

Sep 84 *(K)*

Three types of sensors proposed for nuclear reactors and other systems operating at high steam temperatures respond to the loss of coolant with increasing electrical resistance. All three sensors rely on water, or some other coolant, to serve as a conductor between the small gaps of metal surfaces. As the coolant level drops, the water recedes through small spaces between the conductors and insulators, the conductive paths open up, and the sensor resistance increases.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,350,968, which is available from: Commissioner of Patents, Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For further information, contact: Richard D. Tokarz, Battelle Pacific Northwest Laboratory, P.O. Box 999, Richland, WA 99352; (509) 375-3914.

0461 Design Considerations of Reverberating Chamber

Department of Commerce, Washington, DC.

Jul 84 *(B, K)*

There is increasing interest in a new technique for performing electromagnetic interference/compatibility tests on electronic products and components. The new technique involves establishing a localized, homogeneous, and isotropic electromagnetic field within a metal enclosure called a reverberating chamber. A paddle-wheel tuner or mode-stirrer is used to create the uniformly random field. A new NBS publication, Eigenmodes and the Composite Quality Factor of a Reverberating Chamber (TN 1066), describes a theoretical basis for the design of such a chamber in terms of: (1) dependence of field uniformity on the total number of modes, mode density, operating frequency, and the chamber geometry; and (2) the interpretation of the quality factor for the chamber as a whole.

FOR ADDITIONAL INFORMATION: The publication is available for $4 prepaid from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Order by stock no. 003-003-02510-1.

0462 Detecting Methane Leaks: A remote sensor uses laser radiation backscattered from natural targets

National Aeronautics and Space Administration, Washington, DC.

Dec 84 *(J, K)*

An improved laser system for detecting methane (CH4) concentrations in air uses natural topographic targets without reflecting mirrors. Previous systems had lower sensitivity and thus required mirrors to be placed on the targets to obtain sufficiently strong return signals. The new remote sensor, which is capable of scanning areas of up to 100 m in radius, could also be used for remote detection of natural-gas leaks, and the location of methane emissions in landfill sites.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to Paul F. McCaul, NASA Resident Office-JPL, Mail Code: 180-601, 4800 Oak Grove Drive, Pasadena, CA 91103; (213) 354-2700. In either case refer to NPO-15790/TN.

0463 Detecting Solar-Cell Failures: Circuit identifies a malfunctioning photovoltaic array
National Aeronautics and Space Administration,
Washington, DC.
Sep 84 *(B, C, K)*

The logic circuit detects the failure of one solar cell out of a large array of cells in a residential photovoltaic installation. The circuit indicates that there is a failure somewhere in the array, not which cell has failed. The circuit monitors the normal operation of a photovoltaic array by comparing the voltage supplied to a load by the array to that supplied by a reference photocell. If any one of the cells fails, a comparator energizes a light-emitting diode. To identify the defective cell, the homeowner photographs the array using infrared film in a 35-mm camera. A shorted cell appears on the film as a bright spot on a comparatively dark background.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15741/TN.

0464 Determining Frost Depth and Density: A simple device determines frost density from the volume of the melted frost
National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(K)*

A quick determination of frost depth and density can be obtained without using cumbersome tools or calculations. A rectangular window comprising the base of a Z-shaped device is placed against a frost surface. Frost within the window is scraped into the container end of the device (the top of the Z). When the frost melts, the height of the water is determined from calibrated lines on this piece. The density of the frost is determined from a graph that compares frost thickness to the amount of water.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to Leon D. Wofford, Jr., George C. Marshall Space Flight Center, Mail Code: CC01, Marshall Space Flight Center, AL 35812; (205) 453-0020. Refer to MFS-25754/TN.

0465 Determining Solar-Cell Operating Temperature: A laboratory test measures the effect of windspeed and wind direction
National Aeronautics and Space Administration,
Washington, DC.
Mar 84 *(C, K)*

A recent report describes efforts to standardize the measurement of solar-cell operating temperature. A series of tests has shown that the solar-photovoltaic-cell temperature is extremely sensitive to windspeed, moderately sensitive to wind direction, and rather insensitive to ambient temperature. Tests run under controlled laboratory conditions were compared with outdoor field tests. Although most of the data taken were for one module type, it is likely that the conclusions would apply to other modules, particularly those having a glass front, a polymer back, and a metal frame.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15449/TN.

0466 Determining the Orientation of Anisotropic Materials: Ultrasonics probe the direction of tile fibers
National Aeronautics and Space Administration,
Washington, DC.
Apr 84 *(H, K)*

A hand-held acoustic transducer is used to determine the fiber orientation of heat-resistant tiles installed on the outer surface of the Space Shuttle. The success in this application suggests extending the technique to the inspection of other anisotropic materials. Plywood and fiber/epoxy composites could be examined to determine fiber direction; and ultrasonics could be used to find the direction of roll in sheet metal and other rolled products.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20229/TN.

0467 Determining the Point of Zero Zeta Potential in Solid Samples: In a new technique, the sample does not have to be in powder form
National Aeronautics and Space Administration,
Washington, DC.
May 84 *(B, J, K)*

Although current techniques for measuring the point of zero zeta potential (pzzp) in semiconductors require that the sample be in powder form, that is not always the form in which the material is used. In photochemical cells, for example, a solid semiconductor photoelectrode is usually required. A new technique measures the pzzp in solid samples, possibly making it a more reliable indicator for some materials than are the conventional tests. The method incorporates the sample in a photochemical cell and measures the temperature dependence of the flatband potential.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: LAR-12893/TN.

0468 Developing Standards for Photovoltaic Devices: Ground rules are outlined for evaluating photovoltaic technology
National Aeronautics and Space Administration,
Washington, DC.
Sep 84 *(C)*

Guidelines for developing performance criteria and test standards for photovoltaic devices and systems are described in a report. Differences in terminology, testing methods, reporting conditions, and expectations of performance and reliability have begun to hinder the research and development of photovoltaic technology. In response to these difficulties, the methods and criteria suggested in this report are intended to facilitate standardization for the benefit of designers, distributors, builders, and users of photovoltaic devices and systems.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15734/TN.

0469 Development of a Continuous Monitor for Detection of Toxic Organic Compounds
Environmental Protection Agency, Washington, DC.
May 84 *(E, J, K)*

A research and development program was undertaken to investigate the application of a new analytical technique called tunable atomic line molecular spectroscopy (TALMS) to the detection and monitoring of benzene and other volatile organic molecules of concern to the Environmental Protection Agency. New developments have improved the sensitivity of the TALMS benzene monitor by a factor of 100 to a detection limit of 3 ppm-v benzene.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB83-234922, price: $11.50. For other information contact D. R. Scott, Environmental Monitoring Systems Laboratory, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711.

0470 Development, Design, and Operation of a Cascade Impactor
Environmental Protection Agency, Washington, DC.
Mar 84 *(K)*

The goal of this research project was to design and construct a particle-sizing device that will collect and size source-emitted aerosols on 47-mm diameter substrates for subsequent wavelength-dispersive x-ray fluorescence analysis. A five-stage slit impactor was designed to accomplish this goal. The impactor uses an oscillating drum beneath each jet to collect the sample evenly over a 31- x 34-mm area. Calibration studies were conducted. With this sampling system, readily collected samples can be analyzed directly by wavelength-dispersive x-ray fluorescence analysis for elemental composition.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB83-246157, price code: A04, or contact Kenneth T. Knapp, Environmental Sciences Research Laboratory, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711.

0471 Dielectric Scanning Locates Voids in Glass Foam: Capacitive probes may succeed where X-ray and ultrasonic equipment do not
National Aeronautics and Space Administration,
Washington, DC.
Sep 84 *(H, J)*

A proposed capacitive-probe technique may quickly locate defects in dielectric materials. When fully developed, it is intended to be used on production lines to detect large voids in glass-foam panels for solar mirrors: The detection of strength-limiting flaws would hold down costs by enabling the rejection of parts before subsequent expensive fabrication steps. The new technique may find application in the nondestructive testing of other dielectric objects for internal defects that exhibit dielectric inhomogeneities.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15728/TN.

0472 Digital Phase-Shift Standard: Circuit using just three IC's could be used to perform precise calibration
National Aeronautics and Space Administration,
Washington, DC.
Feb 84 *(B)*

A digital phase-shift standard can be used in combination with an oscillator to calibrate other phase standards and phase-angle voltmeters. Previously, calibration of such phase shifters required several pieces of equipment and lengthy setup procedures. The circuit can be used with input signals as low as 1 volt rms, in almost any waveform. It calibrates phase over a frequency range from dc to 2 kHz. In its present form, the circuit is constructed with complementary metal-oxide-semiconductor integrated circuits. Its frequency range could be extended to 100 MHz if emitter-coupled-logic was used.

FOR ADDITIONAL INFORMATION: Inquiries concerning rights for the commercial use of this invention should be addressed to James O. Harrell, John F. Kennedy Space Center, Mail Code: SA-PAT, Kennedy Space Center, FL 32899, (305) 867-2544. Refer to KSC-11250/TN.

0473 Directional Fluid-Flow Transducer: A probe with strain gages detects lateral fluid force
Department of Energy, Washington, DC.
Feb 84 *(D, K)*

A new rod-shaped probe measures lateral vector components of a fluid force against itself. Intended principally to measure fluid forces on tubes in heat-exchanger tube bundles, the device incorporates a strain-gage technique similar to that used to measure forces in structural elements. The probe is mounted in the fluid with both ends rigidly attached to the walls of the vessel. A rod inside the hollow probe tube is axially restrained and held in tension by mounting screws at the ends. The moving fluid exerts a force on the sleeve, causing the rod to deflect.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,343,198, which is available from: Commissioner of Patents, Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. DOE, Washington, DC 20585.

0474 Discriminating Between Liquid and Gas Flows: Variations in momentum density would change the position of a sensor
National Aeronautics and Space Administration,
Washington, DC.
May 84 *(J, K)*

A proposed flow sensor would distinguish flowing gases from liquids. The sensor would allow liquids to pass, but would signal a valve to turn off the flow of gases. The concept was developed for propulsion systems in which liquid fuel is forced out of a storage tank by a high-pressure gas. A controller based on such a device would stop the flow of gas from the fuel tank after the liquid has been depleted.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15531/TN.

0475 Eddy-Current Damage Test for Carbon Composites: A nondestructive test method detects cracks in materials of low conductivity
National Aeronautics and Space Administration,
Washington, DC.
Jul 84 *(H, K)*

An eddy-current technique detects cracks in reinforced carbon/carbon composites of low electrical conductivity. Originally developed to assess damage to the Space Shuttle leading-edge panel--a carbon/carbon substrate--the

method can be used in many other applications where materials of low conductivity are to be evaluated for damage.
FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB83-926107, price code E02.

0476 Efficient Distribution of Frequency-Standard Signals: Path-length-corrected system can use microwaves or optical links with minimal hardware
National Aeronautics and Space Administration,
Washington, DC.
Mar 84 *(B)*
A low-power system distributes a precise frequency-standard signal to a network of remote stations. The system is 'exact' (i.e., corrected for the transit time), yet is inexpensive because it transmits at only 20 milliwatts and requires no coding or synchronized switching circuits. Its correction capability is a few parts in 10 to the 15th power. The principal is to apply a compensating, advance phase shift to the master transmitter signal and then correct it by comparison with the phase of the delayed signal received from the slave transmitter.
FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15392/TN.

0477 Electricity Calibration Service For Wattmeters and Watthour Meters
Department of Commerce, Washington, DC.
Mar 84 *(B, C)*
The National Bureau of Standards Center for Electronics and Electrical Engineering has published a detailed description of NBS' wattmeter and watthour meter calibration service as a guide for potential users. The service has been offered for some time; improvements in meter design and the higher cost of electrical energy have now brought a need for calibrations at higher levels of accuracy. A Calibration Service for Wattmeters and Watthour Meters (TN 1179) describes the electric circuitry and statistical procedures used by NBS for these calibrations. It allows the potential user to judge whether a routine calibration would be adequate or whether it would be necessary to arrange for a special calibration of greater accuracy and, consequently, of greater expense.
FOR ADDITIONAL INFORMATION: This document is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Order by stock number 003-003-02505-4. $4.75 prepaid.

0478 Electron Beam Could Probe Recombination Centers: Properties of multilevel deep traps could be investigated
National Aeronautics and Space Administration,
Washington, DC.
Aug 84 *(B, J)*
According to a theoretical analysis, an electron-beam probe technique could be used to estimate electron/hole capture cross sections in semiconductors with wide band gaps. Such cross sections can be determined in heavily doped samples by measuring the phase shifts of the short-circuit currents induced by amplitude-modulated electron beams. In the proposed technique, a well-collimated electron beam with sinusoidal amplitude modulation strikes a semiconductor surface and penetrates a short distance. Minority carriers thus generated diffuse to the space-charge region, are accelerated across the region, and are collected by the ohmic contacts.
FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15285/TN.

0479 Electronic Dilatometer: A nonclamping micrometer measures small strains
National Aeronautics and Space Administration,
Washington, DC.
Jul 84 *(H, K)*
An electronic dilatometer measures the minute dimensional changes caused by moisture absorption in graphite/epoxy composites. The instrument handles a sample 6 inches long and has a strain resolution of 0.1 micro-inch/inch. The dilatometer is a relatively-inexpensive electronic micrometer that can accurately measure small changes in the length of a sample. Since the sample is not clamped, the precision and resolution are not affected by clamping forces.
FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to John O. Tresansky, Goddard Space Flight Center, Mail Code: 204, Greenbelt, MD 20771; (301) 344-7351. In either case refer to GSC-12738/TN.

0480 Electronic Force Gage for Welders: Welding force is monitored in process
National Aeronautics and Space Administration,
Washington, DC.
Jul 84 *(G, K)*
A system designed for the calibration and maintenance of resistance welding equipment produces an oscilloscope trace showing the profile of the welding force. The new strain-gage system provides a dynamic picture of the welding pressure and the current pulse. It also allows a permanent record of the variation of the force during the welding cycles. The motion of the deformable member is sensed by the strain gages. Output signals from the strain gages are amplified and fed into an oscilloscope to produce a trace of the welding force.
FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for the commercial use of this invention should be addressed to Leon D. Wofford, Jr., George C. Marshall Space Flight Center, Mail Code: CC01, Marshall Space Flight Center, AL 35812; (205) 453-0020. In either case refer to MFS-25798/TN.

0481 Electronically-Scanned Pressure Sensors: Sensors do not have to be pneumatically switched
National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(K)*
Arrays of pressure transducers (in a wind tunnel, for example) can be scanned electronically by a new continuous scan-based system. The system differs from earlier equipment in that pneumatic switching for measurements, zeroing, and recalibration during a test is unnecessary. All the switching is done electronically. The new system maintains a temperature-controlled environment within the sensor modules so that accuracy is maintained while the ambient temperature varies. The system includes up to 20 pressure modules, each containing 48 transducers that convert pressure into an analog electrical signal.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for commercial use of this invention should be addressed to Darrell G. Brekke, Ames Research Center, Mail Code: 200-11A, Moffett Field, CA 94035; (415) 965-5104. In either case refer to ARC-11361/TN.

0482 Eliminating Wind-Tunnel Flow Breakdown: Floor nozzle ensures more realistic airflow
National Aeronautics and Space Administration,
Washington, DC.
Jan 84 *(D, J)*

Undesirable vortexes near the floor in small wind tunnels are suppressed by a simple device that alters the flow pattern there. Air is injected along the floor and interacts with the backflow from the wind-tunnel model. This results in a smoother, more correct airflow and so to more-reliable wind-tunnel data.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: ARC-11338/TN.

0483 Fast Electronic Solar-Cell Tester: Microcomputer-controlled system gathers current and voltage data
National Aeronautics and Space Administration,
Washington, DC.
Apr 84 *(C, K)*

A microcomputer-controlled system measures solar-cell current/voltage (I/V) characteristics and determines key cell parameters, including short-circuit current; voltage, current, and power at the maximum-power point; and open-circuit voltage. A cell is automatically stepped through a sequence of electrical loads that increase from open-circuit to short-circuit, while the system measures the cell voltage and computes the power output. The data are displayed on a cathode-ray tube (CRT), recorded on an X-Y plotter, or stored on tape.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15676/TN.

0484 Flowthrough Bacteria-Detection System: An online system allows repetitive cycling of sample intake, bacteria counting, and sterilization
National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(E)*

A microbe detection system developed at Langley Research Center collects a water sample on-line, adds a growth medium, incubates it, estimates the number of fecal coliform bacteria in the sample, and then sterilizes the broth in preparation for a new cycle. The bacteria count is estimated without the need for a skilled operator. More than one growth medium and incubation temperature can be incorporated in a cycle, making it possible to detect different groups of bacteria.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for the commercial use of this invention should be addressed to Howard J. Osborn, Langley Research Center, Mail Code: 279, Hampton, VA 23665; (804) 827-3725. In either case refer to LAR-12871/TN.

0485 Focusing X-Ray Monochromator for Synchrotron Radiation
Department of Energy, Washington, DC.
Aug 84 *(K)*

This Oak Ridge National Laboratory (ORNL) X-ray-focusing monochromator increases the useful X-ray intensity obtainable from synchrotron radiation sources by a factor of 5 at 10 keV, ranging up to a factor of 30 for 40-keV X rays. The device operates over an energy range of 2 to 40 keV, which is double the range of other optics. A prototype has been tested successfully that intercepts 3 mrad of divergence. This X-ray-focusing monochromator is of interest to synchrotron X-radiation users and other researchers using or studying variable energy X-ray sources.

FOR ADDITIONAL INFORMATION: Contact: Office of Technology Applications, Oak Ridge National Laboratory, P.O. Box Y, Oak Ridge, TN 37831; (615) 574-4192. Refer to 484/X/TN.

0486 Foil-Resistance Strain Gages: Annealed-constantan, high-elongation gages are used to measure large strains with errors of only a few percent
Army Materiel Development and Readiness Command,
Alexandria, VA.
Oct 84 *(K)*

Because of their sensitivity, applicability, linearity, reproducibility, and ease of use, bonded strain gages are widely used for measuring small strains. In a study undertaken by the U.S. Army Armament Research and Development Command, resistance gages were designed to measure large strains with the intention of carrying over the advantages of the method. In most cases, the nominal gage factors of well-annealed constantan high-elongation gages are within a few percent of two.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A133687/NAA, price code: A03, or contact project officer Robert E. Franz (301) 278-2624.

0487 Gage Measures Recessed Gaps: Tool permits fast and easy measurements
National Aeronautics and Space Administration,
Washington, DC.
Feb 84 *(F, K)*

A new tool measures the separation between recessed parallel surfaces. The tool was developed for measuring the gap between adjacent tiles on the Space Shuttle. Because the tiles have overhanging edges, the tool is designed to slip into the gap from the end so that it extends through a 0.040-inch crack. It measures gaps between 0.200 and 0.400 inch so that gap fillers of the proper thickness can be selected. The tool consists of two arms 0.030 inch thick having a three-finger gaging mechanism at the bottom and a dial indicator at the top. The new tool makes it unnecessary to use feeler gages to measure the gap.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-2030/TN.

0488 Gas-Temperature Measurement With Minimal Perturbation: Heat-flux transducers determine the temperature of hot, high-velocity, turbulent gases
National Aeronautics and Space Administration,
Washington, DC.
Jun 84 *(D, J, K)*

A proposed method for measuring the temperature of hot, turbulent gases uses three heat-flux calorimeters. One calorimeter measures only the radiative heat flux, while the other two measure the total heat flux (convective and radiative) but at two different temperatures. One total-heat calorimeter is mounted in a heat sink (thus externally cooled), and the other total-heat calorimeter is mounted so that it is thermally isolated to produce different gage surface temperatures and, thereby, different convention heat-transfer rates. The method could be adapted for commercial uses in such operations as monitoring the temperatures of flue gases, piped liquid or gaseous products, or internal-combustion or jet-engine exhausts.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB83-926106, price code E02.

0489 Growing Crystals for Infrared Detectors: Unidirectional solidification yields bulk crystals with compositional homogeneity

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(G, H)*

A new process produces Hg(1-x)Cd(x)Te ingots with radial compositional homogeneity suitable for fabricating infrared detectors. The process which uses a stationary growth ampoule and a furnace that moves in one direction, is expected to be useful for the crystal growth of other materials with similar thermophysical properties. The alloy system is preferred for many infrared applications because its properties are uniquely suited to both the detection of infrared radiation and the requirements for fabricating junction devices. In the new process the alloys are prepared by reacting 99.9999-percent-pure elemental constituents in sealed, evacuated, fused-quartz tubing.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to Leon D. Wofford, Jr., George C. Marshall Space Flight Center, Mail Code: CC01, Marshall Space Flight Center, AL 35812; (205) 453-0020. Refer to MFS-25786/TN.

0490 Guide to Calibrating Temperature Devices is Available

Department of Commerce, Washington, DC.
Sep 84 *(D, K)*

National Bureau of Standards researchers recently have developed guidelines on how to calibrate devices which measure temperature and flow of air, water, and steam in buildings. To efficiently operate energy management and control systems (EMCS), these measurements must be accurate. Two reports describe calibration techniques, give examples of how to use them, explain terms and devices, and provide other fundamental information.

FOR ADDITIONAL INFORMATION: Both reports are available from the National Technical Information Service, Springfield, VA 22161. Order On-Site Calibration of Flow Metering Systems Installed in Buildings (BSS 159) by PB84-160993/NAC; $16. Order Calibration of Temperature Measurement Systems Installed in Buildings (BSS 153) by PB84-154004/NAC; $11.50.

0491 Guidelines for Placement of Product-of-Combustion Fire Sensors in Underground Mines

Department of the Interior, Washington, DC.
May 84 *(D, K)*

A strategy was developed for calculating optimum distribution of selected sensors for detecting underground mine fires. This placement strategy would improve the miner's chances for escape by locating sensors where they would most effectively, quickly, and efficiently detect fires resulting from coal or wood combustion.

FOR ADDITIONAL INFORMATION: Contact: Mr. Dave Litton, Pittsburgh Research Center, Cochrans Mill Road, P.O. Box 18070, Pittsburgh, PA 15236; (412) 675-6752.

0492 Highly Stable Lasers for Precision Tests Developed

Department of Commerce, Washington, DC.
Jul 84 *(J)*

There is considerable interest in using tunable, highly stabilized lasers for precision measurements with cooled, trapped ions; for some advanced types of optical memories; and for various precision tests of fundamental physical theories. A team of researchers at the Joint Institute for Laboratory Astrophysics (JILA) reports encouraging results in producing lasers for this purpose. In experiments using two JILA-built ring dye lasers pumped by argon ion laser light at 514 nm, the researchers have demonstrated the real frequency stability of dye lasers locked to reference cavities. Actual linewidths on the order of 750 Hz were achieved, limited by mechanical vibration of the reference cavities. For example, without the strong vibrational peak at 29 Hz, the linewidth drops to 300 Hz, still limited by other vibrational noise. For Fourier frequencies between 200 Hz and 1 kHz, the noise was set by the photon noise in the light used for stabilization (less than 1 Hz equivalent linewidth). Experiments with improved cavity construction and vibration isolation are being prepared. An important future application of this work will be as gravity wave detectors both on earth and in space experiments.

FOR ADDITIONAL INFORMATION: Contact: F. McGehan, Division 360.2, National Bureau of Standards, Boulder, Colorado 80303, (303) 497-3246.

0493 Holographic Interferometry for Large Structures: Whole vehicular components can be analyzed

Army Materiel Development and Readiness Command,
Alexandria, VA.
Sep 84 *(J, K)*

Double-pulse holographic techniques using lasers have been developed for examining mechanical deformation properties of large vehicular structures. The method, developed for the U.S. Army Tank-Automotive Command, can be used to improve vehicle design in terms of acoustic and structural vibration. Previously, such evaluations involved the use of continuous-wave (CW) holography, which restricted the size of the component and the magnitude of deformation that could be analyzed. Double-pulse holographic interferometry consists of vibrating the component externally and recording the reflections of two laser pulses directed onto its surface. Analysis of large structures is possible by the use of highly tuned, ruby lasers for the generation of the pulses. Ruby lasers, unlike CW lasers, can be designed to provide very large output energies allowing the uniform illumination of large surface areas and the generation of observable fringe patterns.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A124102/NAA, price code: A05, or contact project officer Gregory Arutunian (313) 573-1951.

0494 Improved Laser Velocimeter: It can monitor fluid motion in three dimensions

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(J, K)*

A self-alining laser velocimeter uses simple lenses and Doppler-frequency shift by a scattering disk to monitor fluid motion in three dimensions. The instrument includes a continuous-wave laser, a phase shifter, a drive-frequency oscillator, a phase-shift detector, and two synchronous output detectors. The synchronous detectors use the detected light signal and the fundamental component and the second harmonic of the phase-shifter drive frequency to determine the fluid velocity. Three separate optical systems can be operated simultaneously with the same laser and the same phase-shift detector. Thus, x, y, z position and velocity can be monitored.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25465/TN.

0495 Improved Magnetostrictive Materials Developed

Department of the Navy, Washington, DC.
Apr 84 *(D, G, H)*

Researchers have developed improved magnetostrictive materials that are incorporated in a new electro-mechanical transducer patented at the Naval Surface Weapons Center (NSWC) for use as a fluid-flow control device. Simple in design and operation, the flow control device is comprised of a cylindrical housing made from magnetostrictive materials with an electrical coil encircling its longitudinal axis. A tapered plunger, which exhibits negative magnetostriction, is placed within the housing along its longitudinal axis and is seated within a discharge port. A magnetostrictive material is one that changes shape when placed in a magnetic field. The improved magnetostrictive alloys used in this device are generally ternary mixtures of two heavy rare earths, which include praseodymium, terbium, samarium, holmium, erbium, and dysprosium, in combination with iron. This flow control device design, which is available for licensing, provides a less complicated valve mechanism needed, for example, for precise and rapid microliter flow control, for use in mass spectrometers, for supplying anesthesis gases, or for blending fuels in process control systems.

FOR ADDITIONAL INFORMATION: Contact Naval Surface Weapons Center, Code D21, Ramsey D. Johnson, Silver Spring, MD. 20910; (301)394-1505.

0496 Improved O2/H2 Gas-Mixture Sensor: Monitor of mixture concentration uses a catalyzed and an uncatalyzed temperature probe

National Aeronautics and Space Administration,
Washington, DC.
Jul 84 *(J, K)*

A monitor for O2/H2 gas-mixture concentrations consists of a Pt-catalyzed temperature sensor mounted just downstream from an uncatalyzed sensor. Suitable for use in regenerative fuel cells, life-support systems, and other closed systems, the new unit is compact, corrosion-resistant under normal operating conditions, and assembled using standard tube fittings. The exothermic chemical reaction between hydrogen and oxygen on the catalyst heats the catalyzed probe. The uncatalyzed temperature probe serves as a reference-temperature monitor. The new monitors are intended primarily as alarm sensors, initiating a safe system shutdown in the event of high gas-mixture concentrations. However, temperature-difference readings may be recorded and compared to calibration curves as a means of measuring concentrations.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Division, NASA, P.O. Box 8757, BWI Airport, MD 21240. Refer to MSC-20408/TN.

0497 Improvements in Gamma-Ray Coal-Level Sensors: Instrumentation is evaluated at an existing coal-gasification facility

Department of Energy, Washington, DC.
Apr 84 *(D, K)*

A report presents an evaluation of gamma-ray material sensors at a coal-gasification facility. These sensors measure the level and density of coal or ash in the producer or hoppers by measuring the attenuation of gamma rays that traverse the vessels. The report discusses findings derived from an inspection of the existing equipment and proposes several alternatives for improved level/density gaging at the particular facility. The present equipment includes three Co60 sources on the producer and three Ra226 sources, one each on the two coal hoppers and the ash hopper. Geiger-Muller (GM) tubes are employed in the level gages: The tube pulse-processing circuitry is somewhat ahead of the commercial art in that the digital GM output is transmitted rather than the usual analog output. Nal scintillators with photomultiplier tubes are used in the density gages.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DOE/MC/08218-T1, price code: A02. For information not provided in the report, contact G. E. Fasching, Morgantown Energy Technology Center, P.O. Box 880, Morgantown, WV 26505; (304) 291-4374.

0498 Improving a Guarded Hotplate: A modified outer guard ring is heated more uniformly

National Aeronautics and Space Administration,
Washington, DC.
Apr 84 *(K)*

A commercial guarded hotplate, used to test the thermal conductivity of high-temperature insulating materials, was modified by adding layers of insulation to the guard ring. The original design includes five separate heaters, four of which are arranged in a stack containing the specimen. The fifth heater, the outer guard ring, which surrounds the stack assembly and maintains an environmental test temperature, has no built-in thermal barrier. To prevent excessive heat loss in the outward direction, the operator must increase the power supply to hold the desired temperature.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB83-926104, price code EO2.

0499 An Instrument for the Investigation of Particle Fluxes in Marine and Fresh Waters

Department of Commerce, Washington, DC.
Mar 84 *(K)*

The transport of suspended particulate matter is of marked interest to many lines of marine research because of the propensity of particles to act as sites of chemical-physical-biological reactions and because particles are major transport agents for a variety of natural and anthropogenic substances. A new sediment trap to measure the variability of vertical particle fluxes has been designed. The trap collects and seals 10 separate samples during a single deployment thereby minimizing ship use time and mooring costs. The basic design features are (1) the trap is a smooth cylinder with a height to width ratio of 3:1, (2) the cylinder is maintained in an upright position during all mooring and current conditions, (3) all material that falls into the trap is securely enclosed for retention during recovery, and (4) organic growth in the trap is prevented by use of toxins.

FOR ADDITIONAL INFORMATION: Contact: Mr. Edward Tiernan; NOAA/NESDIS/ORTA, FB 4, Room 3308, Stop (D), Suitland, Maryland 20233; (301) 763-2419.

0500 Instrument is Developed to Measure Lead in Human Tibia

Department of Energy, Washington, DC.

Aug 84 *(E, J, K)*

An instrument based on x-ray fluorescence (XRF) method was built to measure the lead content in the region near to the bone surface inhuman tibia in vivo. The measurement is nondestructive and noninvasive. With proper calibration it provides quantitative information about the lead concentration. The counting time, at present, is between 30 to 40 minutes. The radiation dose to the skin surface is 1 Rad. The instrument permits us to measure additional elements like Sr and possible Zn. A prototype has been developed and used on patients. A newer model which utilizes polarized radiation is being built. The instrument is not patented.

FOR ADDITIONAL INFORMATION: Contact: W. Marcuse, Office of Research and Technology Assessment, Brookhaven National Laboratory, Upton, Long Island, New York 11973; (516) 282-2103.

0501 Instrument Measures Airflow Friction Without Contact: A laser interferometer monitors the thickness of a shearing oil film

National Aeronautics and Space Administration, Washington, DC.

Apr 84 *(D, K)*

A new dual-beam laser interferometer determines the airflow friction against a body by measuring the time-varying thickness of a wind-sheared oil film. The measurements yield the skin friction between the film and an airstream. The kinematic viscosity of the oil can also be determined. The interferometer uses two laser beams of known separation. It is therefore more accurate than single-beam interferometers, which require that the distance from the beam to the leading edge of the oil film be determined. Since it is not placed in the wind tunnel, the new interferometer does not affect airflow.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: ARC-11354/TN. This technology is available for licensing.

0502 Isolating Supports for X-Ray Mirrors: Simple concept reduces effects of gravity, temperature, and magnetism

National Aeronautics and Space Administration, Washington, DC.

Dec 84 *(K)*

A concept for mounting paraboloidal and hyperboloidal mirrors and similar optical elements would help to isolate them from magnetic, gravitational, and temperature effects. The mounting scheme would allow inexpensive materials to be used -- for example, high-thermal-expansion materials, such as aluminum, can be used to support a reflector instead of stainless steel or special low-thermal-expansion alloys. In the new scheme, the reflector is supported by a single circumferential ring, which in turn is supported by a conical shell. The single ring is attached near the center of mass of the reflector.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25904/TN.

0503 J-Channel Locks Potting to Compression Panel: Panel ends are supported to prevent edge failure during testing

National Aeronautics and Space Administration, Washington, DC.

Oct 84 *(D, K)*

J-shaped channels embedded in potting compound prevent compression-panel end failures during high-temperature testing. Previous methods of potting the panel ends used glass-bead filler to prevent shrinkage and debonding of the compound from the panel. However, these methods were unsuccessful, as the potting compound cracks and debonds from the panel during cooldown. The new technique uses J-shaped channels, formed from the same material as the panel, that are spot-welded to the panel ends. The panels are then potted with the potting compound covering the J-channels. The potting compound adheres to the J-channels to form a mechanical lock on the panel.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning license for its commercial development should be addressed to Howard J. Osborn, Langley Research Center, Mail Code: 279, Hampton, VA 23665; (804) 827-3725. In either case refer to LAR-12913/TN.

0504 Laser-Based Vacuum Ultraviolet Spectrometer

Department of Energy, Washington, DC.

Mar 84 *(J, K)*

In many branches of pure and applied science, a critical need exists for good quality spectroscopic data and simple techniques in the vacuum ultraviolet spectral region comparable to those obtainable with tunable lasers in the visible regions. In the spectrometer, a laser-based vacuum ultraviolet source is combined with standard absorption and photoionization techniques to provide a sensitive, high-resolution instrument. The light source uses nonlinear optics principles to convert visible laser light to the vacuum ultraviolet while preserving the desirable qualities of intensity, narrow bandwidth, coherence, and short pulse times. The light source may be used as a photoionization source for other instruments, such as mass spectrometers and photoelectron spectrometers. The technique and instrument also have analytical applications.

FOR ADDITIONAL INFORMATION: Contact: D. W. Jared, Oak Ridge National Laboratory, P.O. Box X, Oak Ridge, TN 37830; (615) 574-4192. Refer to 473/X/TN.

0505 Leak Tester for Cryogenic Flowlines: A gas chromatograph measures leakage into cavity surrounding the joint under test

National Aeronautics and Space Administration, Washington, DC.

Jul 84 *(K)*

A technique originally developed to monitor leakage in hydrogen flowlines could also measure the leakage of other cryogenic fluids or volatile liquids, including petroleum and natural gas. The new system surrounds the joint being tested with a sealed cavity. The presence of leakage gas in the cavity is monitored by a gas chromatograph. The gas chromatograph compares the composition of the purge gas with a calibrated mixture of the purge and effluent gases of known relative concentration. The concentration ratio is chosen to approximate that expected in the event of leakage. The cavity need not meet any particularly stringent requirements. It operates at a pressure only slightly above atmospheric, and small leaks in the purge cavity have little effect on measurement accuracy.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Division, P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to MSC-20233/TN.

0506 Lensless Scanning Telescope: Proposed dual-aperture device minimizes aliasing

National Aeronautics and Space Administration, Washington, DC.

Apr 84 *(B, J)*

A new lensless scanning telescope concept was originally developed at Langley Research Center for possible application in a scanning radiometer for a spacecraft. In the spacecraft application, the radiometer would scan at right angles to the line of flight, giving complete coverage from horizon to horizon. Designers of terrestrial optical systems should also be interested in the concept. The desired performance of the new design is good response for 100-km spatial wavelength on the ground at nadir from a spacecraft at 500-km altitude.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: LAR-12648/TN.

0507 Level Sensor for Cryogenic Fluids: Comparator circuit is used with a hot-wire sensor

National Aeronautics and Space Administration, Washington, DC.

Mar 84 *(B, K)*

A hot-wire sensor combined with the voltage-comparator circuit is used to monitor the liquid level in cryogenic-fluid storage tanks. The presence or absence of fluid is indicated by a lamp or other display device. The fluid sensor is a platinum wire. When the wire is immersed, the fluid cools the wire, decreasing its electrical resistance. The presence or absence of liquid is indicated by comparing the probe resistance with a calibrated value. The circuit can easily be adapted for use with several different probes by adding switches and an extra calibration potentiometer for each probe.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20302/TN.

0508 Linear Position-Sensitive X-Ray System

Department of Energy, Washington, DC.

Jan 84 *(E, K)*

A new scientific instrument that will be used for biological and medical X-ray studies of the fundamental properties or organic materials is called a directly exposed self-scanning photodiode linear position-sensitive X-ray system. The detector system improves the study of molecules in such biological materials as proteins and nucleic acids, which are found in all organisms from viruses to man. As X-rays are beamed into solutions of these materials, they strike the molecules and 'bounce off' or scatter at different angles. These angles are then measured and calculated simultaneously in the detector system, providing information on the size, shape, and function of the molecules. Among its many uses, the new instrument can aid in determining the effects of drugs and diseases. This system will be capable of observing these changes in as short a time as one millisecond, when used with synchrotron generators which produce more intense and accurate X-ray beams. The new device performs its calculations in less than 100 billionths of a second, while collecting the information. The results can be displayed immediately on a computer screen or stored for later analysis. The device also has potential uses in a variety of other fields including physics, metallurgy, geology, and astronomy.

FOR ADDITIONAL INFORMATION: Contact: Charles Borso, Argonne National Laboratory, 9700 South Cass Avenue, Argonne, IL 60439; (312) 972-3933.

0509 Low Temperature Concrete Mortar Properties Are Detailed

Department of Commerce, Washington, DC.

Feb 84 *(D, H)*

Lack of knowledge of concrete's mechanical properties at low temperatures has restricted its wide use in LNG, LPG, and other cold containment applications, despite economies in fabrication and material costs and desirable thermal properties. Where concrete has been used, lack of confidence in its strength and behavior has resulted in overly conservative and expensive designs. A new National Bureau of Standards publication presents data designed to rectify this shortage of information. Measured compressive properties include Young's modulus. Other properties tested include splitting and flexural strengths and fracture toughness.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB82-185125, $7.00.

0510 Magnetic Flowmeter for Electrically Conductive Fluids: Improved accuracy is provided with minimum recalibration requirements

Department of Energy, Washington, DC.

Mar 84 *(K)*

Fluid velocity of electrically conductive liquids, such as liquid metals, is measured more accurately and efficiently with a calibrated magnetic flowmeter that operates independently of temperature and magnetic strength. A new flowmeter consists of two parallel tubes, made of a nonmagnetic material, with the same diameter and wall thickness. A rotor with a pair of matched magnets is positioned between the tubes for generating a magnetic fluid around the fluids.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,346,605, which is available from: Commissioner of Patents, Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, US DOE, Washington, DC 20585. For further information, contact Donald J. Raue, Argonne National Laboratory, CMT 200-M-023, 9700 South Cass Avenue, Argonne, IL 60439; (312) 972-3656.

0511 Magnetic Wire-Rope Tester: Rope interiors can be inspected nondestructively

Army Materiel Development and Readiness Command, Alexandria, VA.

Oct 84 *(K)*

A portable wire-rope tester has been developed for the nondestructive inspection of the wire rope used for slings, cranes, and hoists. The tester, developed by the U.S. Army Mobility Equipment Research and Development Command, fits into a briefcase-sized carrying case and is capable of detecting defects on the surface or in the interior of the cable. Two hinged sensor heads are used to saturate magnetically the cable as it is fed through the housing of the tester by rope guides. When an inhomogeneity exists, such as a tear, cut, break, abrasion, or corrosion, a distortion in the magnetic flux results causing a signal to be produced. The signal can be displayed aurally by headphones or visually by a recorder.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A129687/NAA, price code: A02.

0512 Magnetohydrodynamic Analogy Instrument Tests Supersonic Flows

Department of the Navy, Washington, DC.

Jan 84 *(D, K)*

The Naval Surface Weapons Center (NSWC) has developed an instrument for studying supersonic flow in a compressible or liquid medium using the hydraulic analogy technique. The instrument is comprised of a tank holding a shallow layer of mercury through which a model under study traverses. An external magnetic field and current flowing through the mercury are adjusted to induce a force on the mercury simulating the property specific heat ratio or TAIT equation of state exponent. The instrument allows extending the water table hydraulic analogy to specific heat values less than 2.0 and to TAIT equation exponent values greater than 2.0. The instrument therefore allows accurate simulation of supersonic flow in both compressible gas and liquids without building large wind tunnels and tanks.

FOR ADDITIONAL INFORMATION: Contact: Navy Technology Transfer Fact Sheet, Code E411, Naval Surface Weapons Center, Dahlgren, Virginia 22448. Refer to 080704.

0513 Manometer Measures Gas Flow: Apparatus uses water displacement to measure gas flow at low rates

National Aeronautics and Space Administration, Washington, DC.

Oct 84 *(C, J, K)*

A simple apparatus uses a manometer to monitor the gas generated in a lead/acid battery. It measures the time required for the gas to displace a known volume of water. The apparatus was constructed as part of an effort to determine the charging efficiency of a lead/acid cell. The gas generated during charging must be measured accurately since the energy required to generate the gas reduces the amount of energy left for charging. Because the flow rate and pressure are small, at the beginning of the cycle, standard gas flowmeters do not give accurate results.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15686/TN.

0514 Measuring Accurately With Thermocouples: Guidance is provided for detecting errors

Department of Energy, Washington, DC.

Sep 84 *(B, J, K)*

Research has covered various considerations to ensure accurate temperature measurements by thermocouples in hostile environments. A model was developed that stresses the temperature-dependent instantaneous roles played by different parts of the circuit. Methods were developed for promptly identifying thermocouple defects that can introduce gross error and for distinguishing definitely invalid data from data affected merely by routine measurement inaccuracy. Some of the more significant problems of thermocouple thermometry in hostile environments, such as in gasifiers and retorts have been identified.

FOR ADDITIONAL INFORMATION: Contact: Ray P. Reed, Sandia National Laboratories, Division 7116, Albuquerque, NM 87185; (505) 844-6377. Refer to SAND-82-0341 and SAND-82-1518C.

0515 Measuring Coating Thickness: A gage measures the coating thickness in holes

National Aeronautics and Space Administration, Washington, DC.

Oct 84 *(B, F, K)*

A gage for quickly determining the coating thickness in holes on a printed-circuit board could also be used to size small holes in other applications. The gage consists of a spring-loaded tapered probe, a dial indicator, and a pressure-sensitive audible alarm. It is calibrated by insertion of the probe into rings that have the maximum-allowable and average-allowable diameters. If the actual hole diameter is less than the diameter of the 'maximum-allowable' calibrating ring, the coating thickness is considered acceptable.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25633/TN.

0516 Measuring Excess Noise in SDL's: A simple system measures noise deviation in semiconductor-diode lasers

National Aeronautics and Space Administration, Washington, DC.

Feb 84 *(B, K)*

A new instrument gives quantitative information on the excess noise in semiconductor-diode lasers (SDL's). By proper selection of a detector, the instrument can test any SDL from the visible wavelengths through the thermal infrared. Excess noise or amplitude instability is an important performance characteristic of SDL's that limits their usefulness. The operation of the new instrument is based on the known relation between RF noise generated in a photodetector and the average photocurrent or photovoltage.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: LAR-12938/TN.

0517 Measuring Locomotive Drawbar Pull: A coupler pin becomes an accurate and rugged force sensor

Department of Energy, Washington, DC.

Dec 84 *(D, K)*

A new method is available for measuring the dynamic drawbar forces exerted by a railroad locomotive pulling a train. The measurements are necessary for determining the effect of train handling on fuel economy and on locomotive performance. The new method uses a specially designed coupler pin instead of the coupler as the force sensor. In the new pin, the shear forces imposed by the locomotive drawbar are transformed into bending stresses, which are measured by strain gages.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-008437/NAB, price code: A02.

0518 Measuring Nuclear Fuel Temperatures: Ultrasonic-thermometer system offers the most practicable alternative

Department of Energy, Washington, DC.
Nov 84 *(K)*

A study investigated the most viable means to measure the in-reactor temperatures of binary thoria/urania fuel pellets. The most promising approach, the study found, is an ultrasonic-thermometer system that incorporates a sensor probe connected to an acoustic signal-processing electronic unit. An analysis of existing ultrasonic-thermometer technology has shown ways to improve the probe and how to assemble a signal-processing system.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-010056/NAB, price code: A04. For information not in the report, contact R. J. Grossman, Knolls Atomic Power Laboratory, P.O. Box 1072, Schenectady, NY 12301; (518) 393-6611, Ext. 7229.

0519 Measuring Recessed Pins: A sleeve-and-rod-tool measures distances in blind locations

National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(F, K)*

A new tool makes distance measurements in nearly inaccessible locations. It was developed for measuring the small distance from the top of a pin to the body holding it. The pin is 0.136 inch in diameter and the body is 0.184 inch in diameter. The body is recessed in a reamed hole 0.30 inch in diameter: Therefore the pin-to-body distance cannot be observed directly. The tool consists of a sliding sleeve on a central rod. The sleeve fits in the reamed hole and contacts the top surface of the body. The central rod contacts the top surface of the pin. The sleeve and rod are equal in length and long enough to extend out of the hole. Thus, the relationship of the top surfaces of the pin and body is transferred to the top surfaces of the rod and sleeve, where it can be seen.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-19673/TN.

0520 Measuring Slurry Flow: Noncontact ultrasonic instrument is accurate and versatile

Department of Energy, Washington, DC.
Apr 84 *(B, D, K)*

An ultrasonic Doppler-effect instrument measures the flow rates of slurries in pipes. The instrument functions accurately regardless of the temperature, pressure, corrosiveness, abrasiveness, or viscosity of the slurry. It measures both laminar and turbulent flow accurately. A constant-frequency ultrasonic signal (at 500 kHz, for example) from a transducer is transmitted through the pipe wall obliquely into the flowing slurry. The signal is scattered from the particles in the slurry and detected by a receiving transducer. The instrument determines the frequency difference - the Doppler shift - between transmitted and received signals.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PAT-APPL-6,321,345, price code: A02. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For further information contact Dr. A. C. Raptis, Argonne National Laboratory, 9700 South Cass Avenue, Argonne, IL 60439.

0521 Measuring Small Leak Holes: Hole sizes are deduced from pressure measurements

National Aeronautics and Space Administration,
Washington, DC.
Feb 84 *(D, K)*

A novel extension of existing pressure-measuring techniques determines the sizes of small gas leaks. The technique is simple and could be useful in many situations in which small leaks are tolerable but large leaks are not. The measuring apparatus consists of a pitot tube attached to a water-filled manometer. The compartment to be tested is pressurized with air. The new technique has several advantages: It permits each leak to be determined individually in multileak situations, whereas previous methods measured total leakage only. Measurements can be made without touching the surface and without being able to see the leak hole. The inaccuracy inherent in subjectively judging leak size by the feel of the flow is eliminated. The method can be used to measure leakage from compartments of any size. Possible fields of use include aircraft, spacecraft, nuclear reactors, furnace testing, clean rooms, and ventilation systems.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20113/TN.

0522 Measuring Snow's Liquid Water Content

Department of the Army, Washington, DC.
Feb 84 *(D, J, K)*

The liquid, or unfrozen, water in a snowpack has a major effect on the absorption, reflection and transmission by the snow of electromagnetic waves. Often the effect of the liquid water will be to reduce the capabilities of remote-sensing systems, such as the multi-spectral scanners on modern satellites. The most common method of determining the liquid water content in snow has been a method called melting calorimetry. However, this method is slow and small measurement errors can have a major effect on the results, particularly at low liquid water contents. A new technique was developed for determining the amount of liquid water in a snow sample. This technique, which is called the alcohol calorimetric test, consists of dissolving snow in methanol. As the snow dissolves, the temperature of the mixture decreases, and the final solution temperature is almost linearly related to the snow's liquid water content.

FOR ADDITIONAL INFORMATION: Contact: Dr. Andrew Assur, Cold Regions Research and Engineering Laboratory, P.O. Box 282, Hanover, New Hampshire 03755; (603) 646-4292.

0523 Measuring Surface-Shear Stress in a Wind Tunnel: Two-wire skin-friction gage gives both magnitude and direction of mean and fluctuating stresses

National Aeronautics and Space Administration, Washington, DC.

Oct 84 *(D, K)*

A compact skin-friction gage monitors the mean and fluctuating surface-shear stress beneath the three-dimensional boundary layer of flow in a wind tunnel. The gage measures the heat flux from two heated orthogonal wires embedded in the surface of the wind-tunnel model. The magnitude and direction of the skin friction are deduced from electrical signals from a pair of hot-wire anemometers that maintain the wires at constant temperatures. The skin-friction gage was used successfully in various turbulent flow fields, including a separating three-dimensional boundary layer over a cone at high angle of incidence.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: ARC-11384/TN.

0524 Measuring Temperature Profiles of Earth's Surface: Thermal properties of earth are measured in situ

Department of Energy, Washington, DC.

Aug 84 *(J, K)*

A long, cylindrical probe is lowered into a borehole to measure the local specific heat and thermal conductivity of earth. The probe generates and measures a time-varying radial thermal gradient in the material surrounding the borehole. The transient or steady-state values or both of this thermal field are analyzed for thermal-property data. The data are used in geological studies and in designing buildings, roads, and airports.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,343,181, which is available from: Commissioner of Patents, Washington, DC 20231, for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For further information, contact Heinz F. Poppendiek, Geoscience Ltd., 410 South Cedros Avenue, Solana Beach, CA 92075.

0525 Measuring Tension in Transistor Suspensions: Vibration analysis is nondestructive and noninvasive

National Aeronautics and Space Administration, Washington, DC.

Oct 84 *(B, K)*

The tension in tiny filaments that support transistors for thermally isolated operation is measured using laboratory equipment. Vibrations are excited by an audio-frequency driver, observed under a stroboscope, and analyzed by conventional vibration analysis techniques. The method should also be applicable to other filament mounts that are too delicate to be tested by tension probes..

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15677/TN.

0526 Measuring Ultrasonic Shear-Wave Velocity: A technique using a reference sphere increases accuracy

National Aeronautics and Space Administration, Washington, DC.

May 84 *(H, K)*

A new technique improves the accuracy of measurements of ultrasonic-shear-wave velocity. The technique eliminates the need to measure the incident sound angle, which was previously a source of error. In tests of the method, velocity measurements were within 1 percent of published data. In the method, a steel sphere placed in a groove on the sample surface establishes the point of entry with certainty. Once the entry point is known, the velocity measurement proceeds in the conventional way -- by measuring the time it takes for the beam to traverse a known path length.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-19680/TN.

0527 Measuring Wide-Range Gas Flow: Accurate readings are made of flows ranging over three orders of magnitude

Department of Energy, Washington, DC.

Jan 84 *(D, K)*

A report provides guidelines for using the multiple-orifice flowmeter for measuring gas flow. The report describes the development of the multiple-orifice concept, design procedure, and applications as well as the calibration and operation of the device. The report shows that the multiple-orifice flowmeter can perform as accurately as a conventional single-orifice flowmeter while allowing several orders of magnitude improvement in flow measurement range. Both capital and labor savings are realized. ..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-009614, price code: A04. For program-related information not provided, contact D. R. Goff, Morgantown Energy Technology Center, P.O. Box 880, Morgantown, WV 26505; (304) 291-4111.

0528 Method Has Been Developed to Remove Effects of Time Jitter

Department of Commerce, Washington, DC.

Aug 84 *(B)*

The National Bureau of Standards has developed a method for removing distorting effects of time jitter from waveform measurements performed using a fast (20 picosecond) equivalent time sampling oscilloscope. Previously, the calibration of fast pulse generators was hindered by these waveform distorting effects--the faster the measured pulse waveform, the more distorted the measurement became. The NBS method consists of (1) measuring and/or estimating the time jitter probability density function (PDF) and (2) treating the PDF as a 'pseudo-network' impulse response function where the distorting effects are removed from the measured pulse waveform using a network deconvolution computer algorithm. Computer simulations indicate that peak errors in fast pulse waveform estimation of less than one percent can be obtained with this algorithm.

FOR ADDITIONAL INFORMATION: Contact: W. L. Gans, Division 723.05, National Bureau of Standards, Boulder, CO 80303.

0529 Microscopy Opens New Frontier at Berkeley: Two electron microscopes reach unprecedented performance heights, one revealing atoms directly

Department of Energy, Washington, DC.

Oct 84 *(K)*

The National Center for Electron Microscopy (NCEM) at the Lawrence Berkeley Laboratories has acquired two state-of-the-art electron microscopes that have set new limits of performance (resolution). One, a high-voltage electron microscope (HVEM) operating at 1.5 MeV, features resolution on the order of 0.25 nm; the other, known as the ARM (atomic resolution microscope) operating between 0.4 and 1.0 MeV, takes the resolution to atomic size of 0.14 nm. Scientists working with ARM can now see what no one has seen before -- atoms in solids, directly, without computer image-enhancement. Both microscopes, in addition to several others, are available to scientists on the basis of the scientific merit of the research projects.

FOR ADDITIONAL INFORMATION: Contact: Dr. K. H. Westmacott (HVEM), (415) 486-5663; Dr. R. Gronsky (ARM), (415) 486-5674; National Center for Electron Microscopy, Lawrence Berkeley Laboratory, Building 72, Berkeley, CA 94720.

0530 Mixed Conduction in Semi-Insulating Gallium Arsenide: A new analytic technique allows more accurate calculations

Army Materiel Development and Readiness Command,
Alexandria, VA.
Jun 84 *(B, H, J)*

A report presents an analysis of mixed-conduction effects in semi-insulating gallium arsenide. The analysis is based on energy gap, recently deduced electron-to-hole mobility ratios used in related analyses, and newly revised calculations on the effective densities of states. The analysis was performed by the U.S. Army Electronics Research and Development Command. The analytical technique permits consideration of charge-balance effects and impurity concentrations on the same graph. The analytical technique contributes to the ever-increasing use of gallium arsenide in a wide variety of integrated circuits and millimeter-wave and microwave devices. The new method permits more accurate calculations to be made.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A123859, price code: A02 or contact project officer John J. Winter (201) 544-4205.

0531 Modified Oscillograph for Impacting Composite Materials: A commercial instrument is modified to impart energy in a realistic manner

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(H, K)*

A commercial oscillograph that imparts impact energy to elastomeric materials can be modified to perform the same function on composites. The instrument is modified to stabilize the faces of the composite and to impact a smaller area so that the energy is imparted in a more realistic manner -- for example, as a blow that emulates the impact of a ball peen hammer. The modified oscillograph can apply loads up to 400 psi to the surface of a composite material. Composites can be tested to determine the level of impact energy that causes visually undetectable damage to the material.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for the commercial use of this invention should be addressed to Paul F. McCaul, NASA Resident Office-JPL, Mail Code: 180-601, 4800 Oak Grove Drive, Pasadena, CA 91103; (213) 354-2700. Refer to MFS-25901/TN.

0532 Multifunctional Sensor Electrode

Department of Energy, Washington, DC.
Jun 84 *(E, J, K)*

A new, more accurate scientific measuring device for use in electrochemical research and environmental pollution monitoring has been developed. The device called a 'multifunctional sensor electrode,' was developed by the Chemical Technology Division at the Department of Energy's Argonne National Laboratory. Most solutions with dissolved chemicals, such as water with sodium chloride or sulfur dioxide, possess certain properties which can be used to generate an electrical signal using an appropriate electrode. These signals can then be measured and used to determine the composition of the solution. It can be used to identify the presence of pollutants in industrial wastewater, rivers, and lakes. The sensor avoids problems associated with temperature uncertainty, responds quickly to temperature changes, and is readily adaptable to automated system monitoring and control. Special versions of the electrode can be used in many other applications, such as high-temperature industrial production processes, molten salt-based technologies, and electric power plants. The electrode can be miniaturized and used to detect abnormalities in blood and fluids within the human body.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-020862, price code: A02. For information not in the report, contact: Laszlo Redey, Argonne National Laboratory, 9700 South Cass Avenue, Argonne, IL 60439; (312) 972-4518.

0533 Multipurpose X-Ray Residual-Stress Analyzer: System is portable for field inspections

Army Materiel Development and Readiness Command,
Alexandria, VA.
Aug 84 *(H, K)*

A versatile X-ray diffraction system performs residual-stress measurements of aluminum, steel, and uranium alloy components. The system, developed for the U.S. Army Materials and Mechanics Research Center, is designed for use in the laboratory or as a portable unit in the field. The analyzer uses a Cr 30-kV, 10-mA X-ray tube with a goniometer, control console, scintillation detector, and chart recorder. From a diffractograph, diffracted peak positions are determined for calculation of the residual stress.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A127820/NAA, price code: A02, or contact project officer Charles P. Gazzara (617) 923-3479.

0534 National Voluntary Laboratory Accreditation Program

Department of Commerce, Washington, DC.
Nov 84 *(K)*

The seventh annual report from the National Voluntary Laboratory Accreditation Program (NVLAP) provides information on approximately 100 laboratories nationwide that are accredited in one or more areas of testing by the Commerce Department's National Bureau of Standards (NBS). The annual report is in two parts--a report on NVLAP activities and a directory of NVLAP-accredited laboratories. The report gives information on each of the current laboratory accreditation programs as well as those being considered. Information is given on international activities, such as the

International Accreditation Conference (ILAC), and bilateral agreements that provide for mutual recognition of testing laboratories between NBS and foreign laboratory accreditation systems. The directory provides the private sector and federal, state, and local agencies, as well as foreign organizations, with quick access to a list of testing laboratories with proven competence. It lists the test methods for which each laboratory is accredited, identifies the field of testing, and gives the location of the laboratory.

FOR ADDITIONAL INFORMATION: Copies of NVLAP, Seventh Annual Report and Directory of Accredited Laboratories (NBS-SP-677) are available through the Manager, Laboratory Accreditation, B141 Technology Building, National Bureau of Standards, Gaithersburg, MD 20899; (301) 921-3431.

0535 New Device Simulates Realistic Vibration in Flight Vehicles

Department of the Navy, Washington, DC.

Dec 84 *(D)*

The random impact vibration testor (RIVT), developed at the Pacific Missile Test Center (PMTC), Point Mugu, Calif., efficiently simulates realistic vibration in flight vehicles. The stimulus is repetitive impacts by small projectiles on the surface of the test vehicle. The nature of these impacts is random with respect to the relative location, time interval, and intensity between successive impacts. The resultant vehicle vibration resembles that of flight with the characteristics of broad band random noise motion, in many directions, throughout the vehicle structure. The simplicity of the machine is evidenced by its single, motor-driven moving part, the impeller, and by the total fabrication cost being less than $2,000.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, VA 22448. Refer to 090704/TN.

0536 New Directory Of Accredited Laboratories

Department of Commerce, Washington, DC.

Dec 84 *(K)*

The seventh annual report from the National Voluntary Laboratory Accreditation Program (NVLAP) includes a directory of accredited laboratories as of May 1984. The report summarizes significant programs, including approvals and NVLAP participation in national and international activities. Established in 1976, and managed by the NBS Office of Product Standards Policy, NVLAP is a voluntary national program to accredit testing laboratories that are able to meet high standards of performance, including specific test methods on materials or products. Currently, there are laboratory accreditation programs (LAPs) for thermal insulation, ready-mixed field concrete, carpet, solid-fuel room heaters, acoustical testing services, commercial products (paper and paper products, paints and related coatings and materials, and mattresses), and for laboratories that process personnel radiation dosimeters.

FOR ADDITIONAL INFORMATION: For copies of NVLAP, Seventh Annual Report and Directory of Accredited Laboratories (SP 677), or for information on the NVLAP program, contact: Manager, Laboratory Accreditation, B141 Technology Building, National Bureau of Standards, Gaithersburg, MD 20899; (301) 921-3431.

0537 New Hydraulic Analogy Instrument Tests Gasdynamic Flows

Department of the Navy, Washington, DC.

Jul 84 *(J, K)*

The Naval Surface Weapons Center (NSWC) has developed an instrument for studying supersonic flow in gases using the hydraulic analogy technique. The instrument is comprised of a tank holding a shallow layer of heavy liquid, such as mercury, covered by a layer of light liquid, such as water. A test model is moved along the bottom of the tank through the lower liquid, producing a wave pattern at the interface of the two immiscible liquids. The wave propagation speed of waves on the interface between the two liquids can be selected by the choice of thicknesses and mass densities of the two liquids. It is therefore possible to simulate the speed of sound of most gases of practical interest. The instrument permits accurate simulation of supersonic flows at low cost without the need of large wind tunnels. Also, the technique can be used for the simulation of blast waves from explosions, and their interaction with targets.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, Virginia 22448. Refer to 080905/TN.

0538 New Interferometer System Developed For Field Testing of Large Mirrors

Department of the Navy, Washington, DC.

Aug 84 *(K)*

The optical figure of a mirror is a critical factor that determines the focal volume, and therefore, the power density achievable on the target. In order to verify the optical figure of a mirror, a novel figure measurement system was designed tobe used under 'field' conditions and within the limited space at a contractors facility.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, VA 22448. Refer to 090401/TN.

0539 New Time Dissemination Service Available

Department of Commerce, Washington, DC.

Mar 84 *(J)*

The National Bureau of Standards offers a satellite-based time and frequency dissemination service which will make Universal Coordinated Time and the rate of the NBS primary frequency standard available to any laboratory in the world at an accuracy of 10 nanoseconds and one part in 1000, respectively. Commercial receivers, based on the NBS design, are now being produced.

FOR ADDITIONAL INFORMATION: Contact: David W. Allan, Division 524, National Bureau of Standards, Boulder, CO 80303.

0540 Normal-Incidence Soft-X-Ray Mirror: A multilayered interference structure has about 6 percent reflectivity

National Aeronautics and Space Administration, Washington, DC.

Aug 84 *(J, K)*

An interference mirror reflects carbon K X-rays of 4.48-nm wavelength at normal incidence. The mirror consists of 76 layers of tungsten, each 0.765 nm thick, interspersed with layers of carbon, each 1.510 nm thick, all deposited on a <111> silicon wafer 0.38 mm thick and 76.2 mm in diameter. For carbon K radiation at normal incidence, the multilayer structure is predicted to have a reflectivity of about 6 percent.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15828/TN.

0541 Novel Fiberoptic Gyroscope Demonstrated

Department of the Navy, Washington, DC.
Jul 84 *(K)*

A team of scientists at the Naval Research Laboratory (NRL) has developed and laboratory-demonstrated a low-cost, highly sensitive prototype fiberoptic gyroscope that may revolutionize the field of rotation sensors. The prototype gyroscope demonstrates a rotation sensitivity comparable to existing gyros, but has the potential to cost substantially less. Fiberoptic gyros could be used for high-precision air and shipboard inertial navigation, aircraft flight control, and industrial well-logging. In preliminary laboratory tests, the unique NRL sensor performed 'almost perfectly' by indicating a high-sensitivity rotation detection, low-noise level, and a good long-term zero-point stability.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, Virginia 22448. Refer to 080906/TN.

0542 Optical Receiver for a Prototype Remote-Sensing Natural Gas Leak Detector

National Aeronautics and Space Administration,
Washington, DC.
Mar 84 *(J, K)*

An optical receiver for a prototype, man-portable, remote-sensing natural gas leak detector using helium-neon lasers was developed. Laser remote sensors offer a means to scan large areas for gas leaks from a single location. The optical receiver developed in this project was designed to function as part of a short-range detection system (approximately 50 feet) for gas leaks from service lines. The optical receiver was designed to be made man-portable. A fluorinated plastic Fresnel lens (6-inch diameter) was used to collect the backscattered laser radiation.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB83-228221, price code: A02.

0543 Optical-Fiber Dosimeter: Portion of red-to-blue light spectrum transmitted indicates radiation dose

Army Materiel Development and Readiness Command,
Alexandria, VA.
Feb 84 *(E, J, K)*

A report describes a novel radiation-dosimetry system that changes color in response to nuclear radiation. The system, which was developed for the U.S. Army Electronics Technology and Devices Laboratory, is based on ionizing-radiation-induced changes in the refractive index of radiochromic-dye solutions. The principle is adaptable to personal dosimeters. The dosimeter in this case is an optical fiber consisting of a polytetrafluoroethylene tube containing a radiochromic-dye solution in its core. Ordinarily, the solution in the core has a higher refractive index than the tube wall. The fiber then acts as an optical waveguide, propagating light through its length.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A117308, price code: A02 or contact project officer Stanley Kronenberg (201) 544-4333.

0544 Poisoning of Semiconductors

Department of Commerce, Washington, DC.
Aug 84 *(B, J)*

Researchers in the National Bureau of Standards Center for Analytical Chemistry are using the bureau's 10 megawatt reactor to study how sodium ions can cause semiconductors to fail. Sodium can migrate in semiconductors, causing bridges that poison the devices, rendering them ineffective. To examine this, NBS scientists are doping samples with sodium to simulate conditions found during the manufacture and operation of semiconductors. Then using a nondestructive technique called neutron depth profiling (NDP), they are exposing doped samples to a beam of neutrons from the reactor. This allows a map to be made that profiles the depth distribution of sodium in the samples. Data from the NDP research will be used by manufacturers to design barriers for blocking sodium that will be placed within the protective oxide coating on semiconductors. NBS also is mapping other elements in semiconductors, such as boron and lithium.

FOR ADDITIONAL INFORMATION: Contact: Dr. G. Downing, National Bureau of Standards, Washington, D.C. 20234; (301) 921-2166.

0545 Portable Data Logger for Photovoltaic Panels: Instrument measures rapidly changing knee of V-I curve with extra care

National Aeronautics and Space Administration,
Washington, DC.
Jun 84 *(B, C, K)*

A new battery-powered instrument measures the performance of photovoltaic panels and stores the data for later analysis. The data logger is light and compact and can easily be carried to remote field locations. The data logger measures the output-voltage-vs.-load-current characteristic of solar-cell panels. It is very accurate around the knee of the V-I curve, where voltage changes rapidly with current. Previous instruments set the load current and measured the resulting output voltage. To improve accuracy, the new logger divides the load curve into two sections.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15158/TN.

0546 Portable Pallet-Weighing Apparatus: Weighing is safer and more convenient

National Aeronautics and Space Administration,
Washington, DC.
Feb 84 *(D, K)*

Electrical load cells are used in a device that determines the total mass and horizontal-plane center of mass of a fully-integrated Spacelab pallet. The portable apparatus is intended for standard four-trunnion pallets but is readily adaptable to any large Space Shuttle payload or other loads where shifting of cargo is to be avoided.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to John O. Tresansky, Goddard Space Flight Center, Mail Code: 204, Greenbelt, MD 20771; (301) 344-7351. In both cases refer to GSC-12789/TN.

0547 A Portable Radiation Monitor: Battery-operated monitor detects and identifies radiation on site

Department of Energy, Washington, DC.
Apr 84 *(E, J, K)*

A new radiation monitor can detect and analyze trace levels of gamma- and X-radiation on site. Called a multichannel analyzer, the instrument weighs only 15 lb, which makes it light enough to be hand-carried on commercial aircraft or across several miles of rough terrain with no difficulty. This on-site recording and analysis can save days or even weeks it normally takes to process the collected samples in laboratory. The analyzer includes a spectroscopy amplifier, a high-voltage supply, an analog to digital converter operating at 50 MHz, and a preamplifier connector for a germanium detector. It can be used with different types of detectors; for example, scintillation (NaI) and solid state (germanium). The instrument is versatile enough to be used by both trained and untrained operators. In response to an emergency, the instrument can be flown over the suspected sites or lowered into such inaccessible areas as wells or sanitary systems. The recorded data may be interpreted on the spot or transmitted to a data-processing center.

FOR ADDITIONAL INFORMATION: Contact: C. John Umbarger, Los Alamos National Laboratory, MS-K493, Los Alamos, NM 87545; (505) 667-6249.

0548 Portable X-Y Scanner: Lightweight device uses just one drive motor for surface scanning

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(F, K)*

A portable scanner uses just one motor to drive a probe or other fixture in both the x and y directions. At NASA's Marshall Space Flight Center, it is used to move an eddy-current sensor over the surface of a metal plate; however, readers may find other applications for its unique features, which include low power consumption, light weight, and portability. In the new scanner, a 12-volt motor drives a helical shaft. A saddle that holds the eddy-current detector engages the helix with a follower and is thereby moved along the x-scan path.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to Leon D. Wofford, Jr., George C. Marshall Space Flight Center, Mail Code: CC01, Marshall Space Flight Center, AL 35812; (205) 453-0020. Refer to MFS-25687/TN.

0549 Precise Measurement of Effective Focal Length: Computerized instrument measures effective focal lengths to 0.01 percent accuracy

National Aeronautics and Space Administration,
Washington, DC.
Apr 84 *(B, J, K)*

A computer-controlled instrument measures the effective focal length (EFL) of optical systems to 0.01 percent accuracy. The instrument also determines the shape of the focal surface and measures the modulation transfer function at points on and near the focal surface. The instrument achieves its high accuracy by using laser interferometers to measure the critical coordinates. It can also evaluate astigmatism in the lens.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: GSC-12745/TN. This technology is available for licensing.

0550 Primer is Developed for Measuring 60-Hz Fields

Department of Commerce, Washington, DC.
Sep 84 *(C, E)*

Laboratories studying the biological effects of high voltage transmission lines with 60-Hz alternating current lab simulations of electric and magnetic fields should find a new report useful. Prepared by the bureau's Center for Electronics and Electrical Engineering, the report is intended as a primer to help in the measurement of several important electrical parameters such as electric field strength and magnetic induction. The report discusses devices for generating electric and magnetic fields similar to those found near transmission lines. Also included are several sections on how to control variables that can affect the accurate measurement of electric fields. The report shows how fairly simple instruments can be used in animal exposure studies.

FOR ADDITIONAL INFORMATION: The report, Electrical Parameters in 60-Hz Biological Exposure Systems and Their Measurement: A Primer is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402, for $2.25 prepaid. Use stock no. 003-003-02581-1.

0551 Procedures For Airborne Sensors Are Developed

Department of the Army, Washington, DC.
Apr 84 *(E)*

Research was conducted to develop and evaluate procedures for using airborne and spacecraft sensors to accurately, reliably, and cost-effectively identify and map wildlife habitat during the planning stages of Corps projects. Wildlife species will be strategically selected based on the degree they represent groups of species (guilds) and potential for discrimination of habitat variables with remote sensors. Accuracy and consistency of variable detection and mapping using standard photointerpretation and available satellite data analysis techniques are being evaluated at project study sites in selected Corps Districts.

FOR ADDITIONAL INFORMATION: Contact: J.K. Stoll, UASE Waterways Experiment Station, P.O. Box 631, Vicksburg, MS 39180; (601) 634-2620.

0552 Pull Test Verifies Gap Loading: The force necessary to initiate movement of a thin plastic strip is a measure of the gap tightness

National Aeronautics and Space Administration,
Washington, DC.
Mar 84 *(D, K)*

A 'pull' test determines whether the gap between tiles or other parts is properly filled. A strip of polyester film is embedded in the gap along with the filler material, and the force necessary to withdraw the film is measured. The force is a measure of the pressure applied to the gap filler; that is, the tightness of the filled gap. The procedure can determine interface pressures or loads where conventional load-measuring equipment cannot be used. It can be used to check refrigerator-door seals, for example.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20231/TN.

0553 Pyrheliometer With Improved Accuracy, Instrument maintains components at constant temperature and allows tenfold improvement in instrumental accuracy

National Aeronautics and Space Administration,
Washington, DC.
Jun 84 *(C, K)*

An improved pyrheliometer is expected to measure solar irradiance with high accuracy. With a maximum error of only

0.01 percent, the instrument would be 10 times more accurate than previous versions. The improvement in accuracy results from using circuit components having low temperature coefficients, mounting critical components in temperature-controlled ovens and using circuits that cancel connecting-cable errors. These provisions essentially eliminate the effect of temperature and other variations on accuracy.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15398/TN.

0554 Rain and Dew Detector: Moisture between fingerlike electrodes actuates a simple alarm circuit

National Aeronautics and Space Administration, Washington, DC.

Oct 84 *(B, K)*

A multifinger transducer actuates a simple circuit that sets off an alarm when moisture bridges the fingers. The detector could turn on caution signals automatically in traffic areas at the onset of dew or rain and in food drying, where excess moisture could damage the product. The transducer is composed of interleaved copper fingers spaced apart about 0.8 mm; alternate fingers are connected in parallel to form the electrodes. The interleaved electrodes are the capacitance portion of an RC oscillator. Water droplets increase this capacitance, which causes the frequency to decrease.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15370/TN.

0555 Rapid Solidification Processing Research Atomizer Constructed

Department of the Navy, Washington, DC.

Jul 84 *(H, J)*

A team of scientists at the Naval Research Laboratory (NRL) reports the design and construction of a laboratory-scale ultrasonic gas atomizer (UGA) to produce metal powders which is being used as a research tool to develop processing techniques for a new generation of materials. The powder samples generated with this new apparatus will be used for fundamental research in rapid solidification processing (RSP) of a new generation of alloys. The NRL atomization system includes an induction melting furnace, a bottom tapped graphite crucible, a ceramic-coated melt injection nozzle, an atomizing gas jet ring, and a powder collection system. The addition of the atomization facility at NRL now gives the Laboratory fundamental research capabilities in the generation and characterization of rapidly solidified powders.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, Virginia 22448. Refer to 090204/TN.

0556 Reference Material Helps Manufacturers Evaluate Performance of Key Measuring Devices

Department of Commerce, Washington, DC.

Sep 84 *(F, G)*

The National Bureau of Standards (NBS) has issued a new standard reference material (SRM) for evaluating the performance of coordinate measuring machines. Coordinate measuring machines (CMMs) are becoming increasingly common in the aerospace and automotive industries and in the manufacture of farm and construction equipment. They are rapidly replacing the traditional micrometer and caliper for lower-precision measurements and the measurement of machine parts with complicated surfaces. CMMs report the three-dimensional coordinates of the tip of a probe which is moved over the surface of the object that is being measured. There are always physical limitations that introduce small errors in the reported position of the probe tip and CMM users must be careful to purchase machines accurate enough to meet their requirements. The temperature and vibration in the room where the CMM is installed for use can introduce even larger errors. To date, however, there is no single precision of such machines. One of the chief measures of machine performance according to this proposed standard makes use of a ball bar. The NBS Socketed Ball Bar (SRM 2083) comes as a set of three precision balls pinned and cemented onto threaded shafts, a table-mount magnetic socket, a ram-mount magnetic socket (for attachment to the CMM probe mount), and five partially-insulated steel extension tubes 50, 100, 200, 400, and 800 mm in length.

FOR ADDITIONAL INFORMATION: SRM 2083, Socketed Ball Bar Set, is available for $2,000 from the Office of Standard Reference Materials, B311 Chemistry Building, National Bureau of Standards, Gaithersburg, MD 20899; (301) 921-2045. Copies of 'Proposed Standard for Performance Evaluation of Coordinate Measuring Machines (ASME B89.1.12M)' are available from the American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, NY 10017.

0557 Resonance Ionization Mass Spectrometry

Department of Energy, Washington, DC.

Jan 84 *(J, K)*

Resonance Ionization Mass Spectrometry (RIMS) utilizes the elemental ionization selectivity of Resonance Ionization Spectroscopy (RIS) to generate ions for analysis by a mass spectrometer. Because only the atoms of a particular element are ionized, isobaric (same mass, different element) interference normally associated with mass spectrometry is eliminated. The RIMS process can also be used to obtain atomic spectral information from a very small sample (< 10 micro gr.). The technique makes use of a tunable dye laser and standard mass analyzers. RIMS can be applied equally well to magnetic, quadrapole, or time-of-flight mass analyzers. This technique would be useful to eliminate isobaric interference in lanthanide or actinide analysis; it is, therefore, useful in nuclear fuel burn-up studies, environmental monitoring of actinides, etc.

FOR ADDITIONAL INFORMATION: Contact: D. W. Jared, Oak Ridge National Laboratory, P.O. Box X, Oak Ridge, TN 37830; (615) 574-4192. Refer to 472/XTN.

0558 Sample Holder for Cryogenic Adhesive Shear Test: Five samples would be tested in one cooldown

National Aeronautics and Space Administration, Washington, DC.

May 84 *(D, J, K)*

A five-sample holder has been proposed to speed up testing lap-shear strength of adhesives at cryogenic temperatures. The concentric mounting of the components of the new holder would also simplify the alinement of the test fixture. Moreover, the new holder permits use of a simpler cryostat vessel: The holder is immersed in the liquid in the cryostat from above, so a conventional dewar flask can be used to hold the cryogen.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25729/TN.

0559 Scientists Develop New Millimeter Wave Noise Standard

Department of Commerce, Washington, DC.
Sep 84 *(B)*

The National Bureau of Standards scientists, using a horn antenna, have developed the first national reference noise standard in the millimeter-wave region of the frequency spectrum. This cryogenic noise standard, in the frequency range of 75 to 110 GHz, will permit industry and government agencies to further the development and evaluation of critical components for millimeter wave systems. The standard represents a major step in noise standard development and will be useful in communications, defense, and aerospace applications. Design and Error Analysis for the WR10 Thermal Noise Standard gives details on the design and construction of the waveguide horn antenna and isothermal cavity that serve as the noise power standard.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB84-161397/NAC, price code: A03.

0560 Self-Modulated Laser Rangefinder: Longitudinal resonance modes are exploited

National Aeronautics and Space Administration,
Washington, DC.
Jun 84 *(J, K)*

A laser transmitter/receiver measures distances as well as displacements of distant objects (such as vibrating buildings). Unlike previous laser range-finders, the new instrument does not modulate its laser beam with an electro-optic or acoustic/optic device, instead, modulation produced spontaneously by the laser itself is exploited. The new rangefinding system determines the target distance by measuring the phase shift between this detected modulation in the transmitted and received beams.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to John O. Tresansky, Goddard Space Flight Center, Mail Code: 204, Greenbelt, MD 20771; (301) 344-7351. In either case refer to GSC-12761/TN.

0561 Sharp-Focus Composite Microscope Imaging by Computer: Enhanced depth of focus aids medical analysis

National Aeronautics and Space Administration,
Washington, DC.
Jul 84 *(A, E, K)*

A computer image-processing system synthesizes a sharply-focused composite picture from a series of photomicrographs of the same object taken at different depths. The computer rejects the blurred parts of each photomicrograph. The remaining in-focus portions are used to form a focused composite. The system has been used to study alveolar lung tissue and has applications in medicine and the physical sciences.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15207/TN.

0562 Solar-Collector Radiometer: Unit measures up to 30,000 solar constants with 1 percent accuracy

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(C, K)*

A water-cooled Kendall radiometer measures the output of solar energy concentrators. The unit measures irradiance up to 30,000 solar constants with 1 percent accuracy. It responds to wavelengths from ultraviolet to far infrared. The radiometer aperture intercepts only a small portion of the total incident radiation. This radiation enters a blackened cavity where it is converted into heat.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-14986/TN.

0563 Study to Improve Fire Fighter Training

Department of the Navy, Washington, DC.
Nov 84 *(K)*

The Naval Training Equipment Center (NTEC), Orlando, Florida, has been evaluating an advanced fire fighter trainer. To improve the training capability, cost-effectiveness, safety and environmental acceptability of the fire fighting trainers, NTEC is now focusing on low-cost alternatives to the standard oxygen-breathing apparatus (OBA). Alternative methods of producing smoke are also being researched. Use of the current smoke-generation technology results in high temperatures, high cost, and potential environmental pollution.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, VA 22448. Refer to 090604/TN.

0564 Submarine Air Monitoring System Improved

Department of the Navy, Washington, DC.
Jul 84 *(D, K)*

An improved Central Air Monitoring System (CAMS MK II) that can detect hazardous gases (including trace quantities of gases) in a submarine environment has been developed at the Naval Research Laboratory (NRL). CAMS II can monitor an increased number of gases, has a programmable processor that permits the selection of gases to be monitored, and has data recording capabilities. An inadequate oxygen level, the escape of toxic contaminates into the ship's atmosphere, or a buildup of inflammable and explosive gases or combustion by-products (i.e., gases from overheated material or an in-progress fire) are some of the hazards the CAMS II can detect and provide adequate warning for submarine crews.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, Virginia 22448. Refer to 090302/TN.

0565 Submillisecond Optical Knife-Edge Testing: Data are sampled much faster than the optical system drift rate

National Aeronautics and Space Administration,
Washington, DC.
Apr 84 *(B, K)*

A computer-aided measurement technique obtains the knife-edge response (KER) of an optical system within intervals as small as .0001 second. Submicrosecond-response detectors in the optical focal plane convert optical signals to electrical signals that are converted to digital data, sampled, and fed to a computer for storage and subsequent analysis. Because the KER sampling intervals are much shorter than the drift time of the optical system under test, sampled optical data are virtually free of the effects of index-of-refraction gradients that could interfere with measurement reliability. Thus, measurements are only negligibly distorted by thermal, vibrational, or flexural effects or by electronic drift.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: GSC-12740/TN. This technology is available for licensing.

0566 Suitcase-Sized Portable Microbiology and Clinical Laboratories Developed

Department of the Navy, Washington, DC.
Dec 84 *(E, K)*

The microbiological and clinical laboratory capabilities necessary wherever military personnel are deployed have been developed by the Biological Sciences Department of the Naval Health Research Center. The two suitcase-sized prototypes have a combined weight of 25 kg and a volume of 45.5 cubic feet. They contain a McArthur microscope, an electrophoresis apparatus, a waterbath-incubator, a reflectance spectrophotometer, and a centrifuge. Diagnostic reagents for counterimmunoelectrophoresis and coagglutination allow for detection of the bacterial causes of meningitis, diarrheal disease and pneumonia. Urinalysis, routine hematology, serology, and limited chemistry studies can be performed.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, VA 22448. Refer to 090904/TN.

0567 Superconducting High-Magnetic Field Lab Pays Off

Department of the Navy, Washington, DC.
Oct 84 *(J)*

A novel superconducting high-magnetic field research facility, in operation for over a year at the Naval Research Laboratory (NRL), is reportedly saving $500,000 a year when compared to the operational costs for the conventional high-magnetic field facility it is replacing. The cost savings are a result of a reduction of peak electrical power consumption and reduced general maintenance and magnet operational costs which the new system offers over the old water-cooled, high-current, high-magnetic field facility.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, VA 22448. Refer to 090601/TN.

0568 Survivability of Nuclear-Waste Casks: Test program simulated railroad accidents to evaluate the safety of these casks

Army Materiel Development and Readiness Command,
Alexandria, VA.
Jul 84 *(D)*

Several tests were performed to determine the survivability of casks used in transporting nuclear waste by rail. The study, conducted for the U.S. Army Armament Research and Development Command, consisted of simulating railroad accidents involving two different kinds of fires: the torch fire and the pool fire.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A130872/NAA, price code: A08, or contact project officer William Wright (301) 278-4913.

0569 System Measures Low-Level Laser Pulses

Department of Commerce, Washington, DC.
Mar 84 *(J)*

Researchers at the National Bureau of Standards have designed a compact system for measuring energy and peak power of low-level 1.06-micrometer laser pulses. The system handles pulses of 10- to 100-nanoseconds duration, with energy fluenced between 10 to the -16 and 10 to the -11 J/cm sq. Suitable for use as transfer standards, the instrumentation is described and analyzed. The report also includes material on a system for calibrating the transfer standards using a cw Nd: YAG laser with acousto-optical modulation.

FOR ADDITIONAL INFORMATION: This report is available from the Government Printing Office, Washington, D.C. 20402. Order by stock number 003-003-02430-9. $4.50 prepaid.

0570 Test Pattern for IC's: Random-fault densities are measured in an array of standard structures

National Aeronautics and Space Administration,
Washington, DC.
Sep 84 *(B, K)*

Random-fault densities in negatively-doped-channel metal-oxide-semiconductor (NMOS) integrated circuits are measured with the aid of an integrated test pattern consisting of 10 separate areas, each sensitive to different defects. A test pattern is an array of standard circuit elements built into a circuit chip along with, or in lieu of, the integrated circuit that is the objective of the process. Measurements on the array are made and interpreted so that the fabrication process can be corrected as necessary.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15645/TN.

0571 Test-Bench Dynamometer: It would simulate programs for electric/hybrid vehicle design

National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(F, K)*

A proposed test bench would confirm the operating characteristics of motors and drive mechanisms. Originally proposed for testing simulation models for future electric/hybrid vehicles, the test bench would be fabricated from available materials and would include a 20-hp dc motor with appropriate controls, a loading system made up of a conventional automotive transmission, and a 20-kW alternator. Air bearings would be used in the drive motor and alternator/transmission mounts.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15084/TN.

0572 Tester for Friction Rock Supports

Department of the Interior, Washington, DC.
Jul 84 *(D, K)*

A reliable, portable device for non-destructively testing the support integrity of a friction rock support was developed. The friction rock support, used to support mine roof and ribs, is a slotted tube driven into a drilled hole of smaller diameter. Upon installation, the tube is compressed radially. The amount of compression is a function of the hole diameter, the strength of the host rock, and the properties of the split set itself. The lightweight self-contained device determines the pull-out resistance of the friction rock supports in-situ, based on measurements of the tube's deformation.

FOR ADDITIONAL INFORMATION: Contact: Mr. John Conway, U.S. Bureau of Mines, Spokane Research Center, E. 315 Montgomery Street, Spokane, WA 99207; (509) 484-1610.

0573 Thermoelectric Heat-Flux Gage: Simple device yields accurate results

Army Materiel Development and Readiness Command, Alexandria, VA.

Aug 84 *(J, K)*

A feasibility has been established of using a commercially-available thermoelectric device as a heat-flux gage at moderate temperatures. In heat-transfer measurements, in which heat is to flow from a warm fluid to a cold wall (for example, to the blades of a gas turbine), the gage could be a useful instrument. The thermoelectric devices are essentially heat pumps that remove heat from the cold wall as it is supplied by the warm fluid. The rate of heat pumping is proportional to the electric current through the thermoelectric devices. Thus, the current is a measure of the heat flow into the cold wall.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A129523/NAA, price code: A02, or contact project officer Isaac Lopez (216) 433-6154.

0574 Thermographic Testing of Composite Materials: Techniques and equipment are reviewed

Army Materiel Development and Readiness Command, Alexandria, VA.

Jun 84 *(H, K)*

A report discusses thermography as a technique for studying composite materials. Thermography is based on the assumption that defects, inhomogeneities, and other undesirable conditions will appear as local hotspots or coldspots on an isothermal map (composed of contours of equal temperature). To apply the technique, one must first excite a thermal pattern in the object to be studied; second, measure the temperature distribution on the surface of the object (see figure); and third, interpret the results according to the established, well-understood physical principles. The state-of-the-art is well advanced for steps one and two, but is still in the developmental stage for step three. The report reviews available thermographic nondestructive testing techniques. Contact and noncontact methods are discussed. Special emphasis is placed on noncontact infrared measurements.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A114392, price code: A03, or contact project officer Joe Pratcher (314) 263-3079.

0575 Thickness Gaging of Vapor-Deposited Metal Films: Phase-sensitive eddy-current instrument and microprocessor determine thicknesses with (25-nm) precision

Department of Energy, Washington, DC.

Dec 84 *(H, K)*

A gaging technique measures thicknesses of copper and aluminum films vapor deposited on polyimide reel-to-reel tapes. The measurements are free of contact between the film and the instrument and are produced with a 25-nm precision. The technique is based on phase and amplitude information from a commercially available eddy-current test instrument. The system, now known as the vapor-deposition gage, has evolved into an automatic reel-to-reel-type fixture controller.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE84-004050/NAB, price code: A02. For further information, contact: Edwin D. Harvey, Monsanto Research Corp., Mound, P.O. Box 32, Miamisburg, OH 45342; (513) 865-3274.

0576 Totally Optical Technique for Monitoring Ambient Non-Methane Hydrocarbons

Environmental Protection Agency, Washington, DC.

Sep 84 *(J, K)*

A method for measuring ambient levels of nonmethane hydrocarbons (NMHCs) has been developed, and a prototype instrument based on that method has been fabricated. The instrument consists of a sample conditioner and an optical CO2-CO analyzer. Any NMHCs and CO are catalytically oxidized to CO2 and then directed to one of two absorption cells in the optical analyzer. The CO2-CO optical analyzer measures two concentrations, that of the CO2 resulting from conversion of NMHCs and CO as well as that of the CO present in the sample initially. Unique optical designs using gas filter correlation, as well as the prospect of a combined CO and NMHC monitor requiring no consumable compressed gases for operation, make the prototype promising for ambient air monitoring.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB84-152800/NAC, price: $11.50, or contact William McClenny, Environmental Sciences Research Laboratory, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711.

0577 Two-Degree-of-Freedom Mount System for Flutter Models: Flexible rods replace conventional bearing supports to minimize structural damping

National Aeronautics and Space Administration, Washington, DC.

Jun 84 *(D)*

A new mount system for wind-tunnel flutter models introduces very little damping to the model dynamics. The aerodynamic damping is therefore not masked by the effects of the mount system, making more accurate studies possible of how the aerodynamic damping varies as flow over the model is changed. This new system is called PAPA, an acronym for pitch and plunge apparatus. With the new mount system, the steady-state and oscillatory pressures currently-available force-input techniques to drive the mount system so that unsteady pressures can be measured on the model as it oscillates.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Division, P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100 Ext. 241. Refer to LAR-12950/TN.

0578 Two-Slit Optical Particle-Measuring System: Sizes and velocities are quickly estimated

Department of Energy, Washington, DC.

Feb 84 *(K)*

An automatic system optically determines the approximate sizes and speeds of particles suspended in moving fluids. The system could be used on combustion exhausts, coal-gasification plants, and other process streams where particle-size distributions and flow velocities are important. Particles in the observed volume are imaged by a lens onto a mask with two slits in front of a photodetector.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-006880, price code: A02. For licensing information, contact: Office of Assistant General Counsel for Patents, US DOE, Washington, DC 20585. For further information, contact Daniel A. Tichenor, Combustion Research Division - 8521, Sandia National Laboratories, Livermore, CA 94550; (415) 422-2137.

0579 Ultrasonic Detection of Fatigue Cracks: Report notes progress in ultrasonic characterization of crack growth

Department of Energy, Washington, DC.
Nov 84 *(H, K)*

A report reviews recent advances in ultrasonics to characterize fatigue cracks. The size, aspect ratio, and orientation of open cracks can now be accurately determined. Characterization of totally or partially closed cracks is still difficult. Evidence indicates that the true crack tip can be detected. The report proposes quantitative characterization of fatigue cracks as an avenue for further research. The report concludes that ultrasound has advantages over other methods as a characterization technique. It may lead to the solution of problems such as the effects of external gaseous environments and random loading on fatigue cracks.

FOR ADDITIONAL INFORMATION: The article by O. Buck and B. R. Tittmann, 'The Ultrasonic Characterizations of Fatigue Cracks,' appears in Advances in Crack Length Measurement, p. 413, C. J. Beevers (Ed.), Cradley Heath, Warley, West Midlands, U.K., 1982.

0580 Ultrasonic Tube Tester: Probe provides complete scanning of tubular materials

Department of Energy, Washington, DC.
Oct 84 *(G, K)*

An ultrasonic probe has been developed for detecting transverse, longitudinal, and circumferential defects in plastic, metal, or ceramic tubes. Conventional ultrasonic methods for examining tubules have been tedious, time consuming, and very limited with respect to scanning capabilities. The ultrasonic probe consists of a pair of rotatable mirrors, a drive motor, and two transducers housed in a cylindrical case. Tube defects are detected by reflections of the waves travelling back to the mirrors and into their respective transducers.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,361,044, which is available from: Commissioner of Patents, Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For further information, contact: David S. Kupperman, Building 212, Argonne National Laboratory, 9700 South Cass Avenue, Argonne, IL 60439; (312) 972-5108.

0581 Uncooled IR Detector: Detector combines a liquid-crystal film with a light-sensitive solid-state array

National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(B, J, K)*

An infrared (IR) image detector consists of a heat-responsive liquid-crystal film between a visible-light source and a light-sensitive solid-state array. The combination detects IR images with continuous readout and potential for image storage. It requires no cooling, unlike most solid-state IR detectors that must be cooled to reduce background noise. The liquid-crystal film acts as an IR detector when maintained just below the temperature of transition from opacity to transparency. When IR radiation is absorbed by this film, the resultant heating changes its visible-light transmission, thereby modulating the uniform visible-light beam as it passes through the film. The variation in light intensity is then read by the detector array.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-14832/TN.

0582 Universal Pin Electronics Tester: Improved performance and reliability are obtained at reduced cost

Army Materiel Development and Readiness Command,
Alexandria, VA.
Jul 84 *(B, K)*

A new testing system, known as Universal Pin Electronics (UPE) and developed for the U.S. Army Communications Electronics Command, utilizes the latest in chip technology for testing current and future IC systems. The principal feature of the UPE tester is the use of a distinct and comprehensive channel of test electronics for each set of pins or leads to the unit under test. The major elements in each channel are an input/output interface, local memory, A/D and D/A converters, logic-level generators, algorithmic pattern generator module, decoder/frequency multiplier, clocks/delays, and other subsystems to provide a full spectrum of analog, parametric digital, and functional digital stimulus/measurement testing capabilities. An entire test system can operate at repetition rates of 100 MHz and with test vectors of 250,000 bits. Because of its small size, the tester can be connected to the unit under test with the smallest possible leads, insuring optimal signal integrity and eliminating the need for expensive interfaces. Its size also makes UPE circuitry suitable for built-in test applications.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A126660/NAA, price code: A06, or contact project officer John Agrios (201) 544-4751.

0583 Vehicle Ride Quality Meter

National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(D, K)*

A device designed to measure the ride quality of passenger carrying vehicles has been developed recently at the NASA Langley Research Center. This device is portable and is capable of providing estimates of passenger comfort for a broad spectrum of vehicles. The ride meter measures and records vehicle ride characteristics, evaluates this data, and generates a real-time ride comfort output reading. Output in terms of 'discomfort units' is an immediate estimate of the total discomfort that may be expected by an occupant of the specific vehicle being evaluated. The ride quality meter provides a means for comparison of ride characteristics of various vehicles or vehicle configuration and is a useful vehicle design evaluation tool. It allows for design trade-off comparison when performance characteristics versus occupant comfort is considered. The meter is small size, lightweight, and can be powered by battery or from a 12 volt

test vehicle source. This device has ride comfort measurement potential for a wide variety of passenger carrying vehicles which include fixed and rotary wing aircraft, watercraft, hovercraft, on and off road work and recreational vehicles, farm machinery, spacecraft, and submersibles. It also has application potential for fixed installations where machinery operators are subjected to noise and vibration.
FOR ADDITIONAL INFORMATION: Contact: TECTRA fact sheets, School of Business and Public Administration, California State University, Sacramento, CA 95819; (916) 454-6640. Refer to TECTRA-Case-A15-22/TN.

0584 Vibration-Isolation Bench for Testing in Vacuum: Precise optical systems can be tested without contamination
National Aeronautics and Space Administration,
Washington, DC.
Aug 84 *(K)*
A vibration-isolated test bench is made from low-outgassing materials so that it can be used in vacuum. It was developed for precise optical systems that must not pick up contamination from the outgassing of nearby objects. A scaled-down version might find wider application in electron optics or electron-beam lithography. Each vibration isolator (see figure) has an air spring to suppress vertical vibrations. The leveling valve controls the air pressure to maintain the steady-state level of the piston: The vertical position is sensed by the valve-activating lever. A fine screw adjustment sets the lever bias.
FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagram is available by ordering the monthly subscription package, order number PB83-926108, price code E02.

0585 Viewer Makes Radioactivity Visible: A battery-operated viewer could aid in contamination surveys and medical diagnoses
National Aeronautics and Space Administration,
Washington, DC.
Apr 84 *(E, J, K)*
A prototype battery-operated viewer has demonstrated the feasibility of generating three-dimensional visible-light simulations of objects that emit X-rays or gamma rays. The device could prove useful in applications ranging from radioactivity contamination surveys to monitoring radioisotope absorption in tumors. From any viewing angle, the field of view is approximately as wide as one would see looking through a small window of the same size as that of the detector in the instrument.
FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: GSC-12640/TN. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to John O. Tresansky, Goddard Space Flight Center, Mail Code: 204, Greenbelt, MD 20771; (301) 344-7351.

0586 Wire Tester: Detects breaks, changes in cross section, and embedded foreign material
Department of Energy, Washington, DC.
Dec 84 *(B, J, K)*
A new wire tester developed to detect breaks, changes in cross section, and embedded foreign materials in superconducting wires is practical and saves time and cost in uncovering the faults before a superconducting magnet is assembled. Made to test a rectangular wire, the tester can be modified to accommodate wires of other cross sections, including slim metallic pipes and rods. Laboratory tests of the wire have demonstrated that a notch as small as 62 by 4 mils is detectable.
FOR ADDITIONAL INFORMATION: Contact: George Gibson, Lawrence Berkeley Laboratory, Building 50-340, Berkeley, CA 94720; (415) 486-5451.

0587 Wristwatch Dosimeter: Besides telling the time, a device indicates radiation dosage and dosage rate
Department of Energy, Washington, DC.
May 84 *(E, K)*
A portable radiation detector utilizes a cadmium telluride crystal in a digital-wristwatch housing. The instrument sounds an alarm when a dangerous radiation field exists and also functions as a timepiece. The dosimeter electronics are built on three ceramic substrates that are stacked vertically inside the case. It can be programed to respond and generate an alarm in a number of different ways. For example, it can act as an accumulated-dose meter. In this mode, the four large digits of the liquid-crystal or light-emitting-diode display will read accumulated dose up to 3,000 mrd, and two digits in the upper right-hand corner of the display will read out the integration time in minutes or hours, as selected by the wearer. A scaler/timer mode allows the dosimeter to act as a count totalizer. The dosimeter is also programable to act as a digital ratemeter. Finally, there is a built-in multiscale mode, which enables the instrument to accumulate radiation counts for a given time and store the results.
FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-006894, price code: A03. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. DOE, Washington, DC 20585. Refer to PAT-APPL-6-369,305. For further information, contact: Michael Wolf, Los Alamos National Laboratory, Box 1663, MS K493, Los Alamos, NM 87545; (505) 667-2977.

0588 X-Ray Detector for 1 to 30 keV: Array of deep silicon cells can be used for imaging or spectroscopy
National Aeronautics and Space Administration,
Washington, DC.
Mar 84 *(B, J, K)*
An array of silicon X-ray-detecting diodes measures photon energy and provides an image of the X-ray pattern for photon energies in the range from 1 to 30 keV. Originally developed for use in X-ray telescopes, the detector array should also prove useful in industrial part inspection, pulsed-plasma research, and medical applications. The spectrometer sensor consists of an array of adjoining silicon diode cells. Each diode has a central electrode. A rectangular vertical grid of metal forms the walls of the cells.
FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to John O. Tresansky, Goddard Space Flight Center, Mail Code: 204, Greenbelt, MD 20771; (301) 344-7351. In either case refer to GSC-12682/TN.

0589 X-Ray Diffraction Polarization: Polarization ratios are key factors in applying X-ray diffraction methods for accurate analysis of materials

Army Materiel Development and Readiness Command,
Alexandria, VA.
Sep 84 *(J, K)*

The beam in a crystal monochromated X-ray diffraction experiment is usually polarized, and the degree of polarization must be known so that the correct polarization factor is used in interpreting the data. Since most users assume that a crystal monochromator is an ideal mosaic diffractor in an unpolarized X-ray beam, they estimate the degree of polarization. In a study conducted by the U.S. Army Materials and Mechanics Research Center, it has been shown that this assumption is incorrect, and the usual deviation from the correct value introduces a significant amount of error in analyses, especially at wavelengths above 1 angstrom. If it is not possible to use a direct or indirect method of determining the polarization ratios, a reasonable approximation could be obtained for the apparatus by using a mathematical formula..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A133181/NAA, price code: A02.

0590 X-Ray Inspection of Transistors: A component holder speeds examination of matched pairs

National Aeronautics and Space Administration,
Washington, DC.
Sep 84 *(B, G, K)*

A simple but effective technique speeds and helps to assure the regularity of X-ray inspection of matched pairs of potted transistors. The only extra equipment required is small blocks of plastic and a roll of adhesive tape. Multiple-channel imaging systems require large numbers of electronic components in pairs having matched characteristics. For reliability, the connections within each component must be inspected by X-ray photography. The new procedure is fast, assures proper orientation, and reduces confusion. The components within each pair are affixed to opposite sides of a small polymethylmethacrylate block by fastening their leads to a common face with thin plastic adhesive tape. The components are placed near a corner in contact with the film. A single flip of the block around the corner adjacent to the components positions the components for the second view.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15675/TN.

0591 X-Ray-Diffraction Residual-Stress Analysis: Nondestructive method allows measurement of surface stresses in metal and ceramic materials

Army Materiel Development and Readiness Command,
Alexandria, VA.
Jul 84 *(H, K)*

A concise summary, prepared by the U.S. Army Materials and Mechanics Research Center, discusses the application of X-ray-diffraction methods to the measurement of residual surface stresses in crystalline materials. The summary is composed of five sections covering basic theory, history and progress, X-ray-diffraction residual-stress analysis (XRDRSA) apparatus, technical problems, and applications. The published summary is intended as a working manual for potential users of the XRDRSA who have little background in this field.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A130614/NAA, price code: A03 or contact project officer Charles P. Gazzara (617) 923-3479.

MANUFACTURING & INDUSTRIAL ENGINEERING

0592 Absorbable-Susceptor Welding of Ceramics: The susceptor would become part of the joint

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(G)*

A proposed technique for welding ceramic parts is based on the radio-frequency (RF) induction heating of a metal strip or other electrically conductive material (the susceptor) placed at the joint between the ceramic pieces. The susceptor, heated to a high temperature by the RF energy, melts the adjacent ceramic material. The susceptor then dissolves in the molten ceramic. When cooled, the ceramic parts form a monolithic assembly. The absorbable-susceptor technique should be suitable for joining complex subassemblies in heat exchangers or other ceramic process equipment for high temperatures. The joints would be strong, pressure-tight, and resistant to a variety of corrosive atmospheres. They are expected to outperform pressed mechanical joints, adhesive- or cement-bonded joints, and even brazed joints (which are limited by the properties of the brazing material).

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15640/TN.

Accelerated Solar-UV Test Chamber: Medium-pressure mercury-vapor lamps provide a high ratio of ultraviolet to total power
See 0446

Acoustic Levitation With Less Equipment: Certain chamber shapes require fewer than three acoustic drivers
See 0447

Acoustic-Emission Methods for Composite Materials: Techniques can be used for quality control and nondestructive evaluation
See 0448

0593 Air-Lubricated Lead Screw: Submicrometer accuracy is anticipated

National Aeronautics and Space Administration,
Washington, DC.
May 84 *(F)*

A translation stage under development at NASA's Jet Propulsion Laboratory rides on a cushion of compressed air. Originally developed to position precisely an interferometer retroreflector for airborne measurement of solar infrared radiation, the device will have a positioning accuracy of 0.25 micron. The translation mechanism includes a metallic lead screw with 40 threads per inch and a matched plastic nut that is fabricated in two half sections. Compressed air is injected into plenums in the two halves of the nut and from there is channeled into the passageway between the mating threads through 12 orifices.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15617/TN.

Analytical Methods for Glass-Fiber-Reinforced Composites: Techniques for quality control are reviewed
See 0746

Annealing Solar Cells With Lasers: Large-area process removes ion damage
See 0301

Attitude Control by Localized Outgassing: Reaction forces and torques would be generated by vaporizing material with a laser
See 0452

Automatic Flowsheet Layout: Software package provides instructions for an automatic drawing machine
See 0193

0594 Axial Compressor Design and Analysis: Program yields blade configurations and aerodynamic flow fields

National Aeronautics and Space Administration,
Washington, DC.
Jun 84 *(A, D, F)*

A computer program for multistage axial compressor design and analysis consists of three sections -- two blade design sections and an aerodynamic section. The program is structured such that any one section may be used in conjunction with either or both of the blading sections. Output is compatible with the NASTRAN stress analysis program.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to LEW-13488/TN.

0595 Ball Bearing Assembly Device Developed

Department of the Navy, Washington, DC.
Jul 84 *(F)*

A ball bearing assembly device for permitting dry assembly of bearings without additional equipment has been developed by the Naval Surface Weapons Center. The assembly device is provided with an inner body surrounded by an outer body so as to create a circumferential gap therebetween. The gap is provided with a vacuum connection which allows positioning of ball bearings on a ball bearing shaft or inner bearing ring when the shaft or ring is mounted on the inner body. The bearing shaft is placed into the inner body so as to provide a mounting to aid in insertion of the bearing shaft or ring into the outer bearing ring. The bearing shaft may be mounted on a reciprocating shaft for insertion into the outer bearing ring.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, Virginia 22448. Refer to 090203/TN.

Bearing Measuring Fixture: Tool increases accuracy and reduces labor
See 0453

0596 Bender/Coiler for Tubing: An easy-to-use tool makes coils of tubing

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(F)*

A new tool bends tubing through any required angle, even through 360 deg for coil-winding. Conventional tube benders, in contrast, are limited to bends of 180 deg or less, and most tube coilers require considerable skill to set up. In the new tool, the operator turns handle, causing a die to wrap the tubing around a mandrel. The mandrel diameter is equal to the required diameter of the tubing bend.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20410/TN.

Better Seals for Vacuum Bags: A roller tool spreads an even layer of adhesive
See 0749

0597 Buyer's and User's Guide to Flexible Manufacturing Systems: Detailed advice is offered on acquiring a system, installing it, and operating it

Army Materiel Development and Readiness Command,
Alexandria, VA.
Jun 84 *(F, G)*

Volume III of the Flexible Manufacturing System Handbook, prepared for the U.S. Army Tank-Automotive Command Research and Development Center, is a buyer's and user's guide to technology for increasing productivity in the middle ranges of manufacturing volume. It is designed to serve as a detailed guide to planners at corporate and plant levels close to the manufacturing environment. It shows how to specify and purchase a flexible manufacturing system (FMS) and then deals with installation and operation.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A127929, price code: A06, or contact project officer David Pyrce (313) 574-6722.

0598 CAD/CAM for Foundry Castings: High-quality steel-sand castings can be made quickly, inexpensively, and accurately

Army Materiel Development and Readiness Command,
Alexandria, VA.
Apr 84 *(A, D, G)*

A report discusses development of computer aids for designing molds for steel sand castings. The development is part of a program for the U.S. Army Tank-Automotive Command whose goal is a comprehensive computer-aided-design/computer-aided-manufacturing (CAD/CAM) process. When complete, the process will utilize two-dimensional and three-dimensional computer graphics for displaying the components for interactive design of molds and will incorporate analyses of heat flow, fluid flow, and stress analysis to provide for casting soundness. The report describes two-dimensional computer graphics with assembly capability for interactive design of the mold configuration. It also describes semiautomatic routines for two-dimensional and three-dimensional heat flow and fluid flow.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A117338, price code: A08 or contact project officer Jim Chevalier (313) 574-6065.

0599 CAD/CAM Techniques for Forging Spiral Bevel Gears: Machining time and costs are substantially reduced

Army Materiel Development and Readiness Command,
Alexandria, VA.
Apr 84 *(F, G)*

Computer-aided design and manufacturing (CAD/CAM) techniques have been developed for the production of spiral bevel gear sets by precision forging. The work was conducted for the U.S. Army Tank-Automotive Command. Precision forging involves the design and manufacture of forging dies which can produce components to near-net-shape, reducing the amount of machining required. Advantages of the process include reduction of material losses, reduction of production costs, and increases in fatigue life of up to 30 percent. Previously, the cost effectiveness of precision forging has been limited by the extensive time and costs required to produce successful dies.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A124578, price code: A06 or contact project officer T. Altan (313) 574-6373.

0600 Catalog of Laminate Layers for Fluidic Devices: Basic functions are classified and discussed

Army Materiel Development and Readiness Command,
Alexandria, VA.
Aug 84 *(D, K)*

A report catalogs layers for laminated fluidic devices. The laminates are in a standard format--called 'C' format--that allows optimal flexibility within its 1.3-by 1.3-in. (3.3-by 3.3-cm) area and produces a vertical stack of horizontal laminated elements from which fluidic circuits can be built up. The catalog of C-format laminates is intended to be used in combination with another report, 'Design Guide for Laminar Flow Fluidic Amplifiers and Sensors.' Together, the two reports serve as a handbook to assist engineers in the design and assembly of fluidic circuits for control applications. The catalog was prepared for the U.S. Army Electronics Research and Development Command. The catalog groups laminates according to their general function: active elements, exhausts, gaskets, resistors, transfers, vents, and miscellaneous. The active elements are primarily fluidic amplifiers, and they are consequently the most critical items in terms of manufacturing accuracy and precision.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A128549/NAA, price code: A03, or contact project officer James W. Joyce (301) 394-3080.

Ceramic 1,500C Test Furnace: Unit is inexpensive, easy to construct, and requires little power to operate

See 0455

0601 Checking Surface Contours: Rubber impressions are viewed with an optical comparator

National Aeronautics and Space Administration,
Washington, DC.
Feb 84 *(K)*

Surface features that cannot be viewed directly or measured easily can be observed as impressions in a removable silicone-rubber casting of the critical area. The method has been used to check the weld quality of the seam between the two hemispheres of a spherical pressure vessel. A simple mold is constructed from aluminum sheet or any other easily shaped material compatible with the silicone-rubber ingredients. The mold is placed over the surface to be measured. A newly-mixed silicone-rubber compound is poured in the mold. Once hardened, the silicone-rubber casting is removed and cut into thin sections. The sections are placed on an optical comparator and magnified 10 to 50 times so that their projected profiles can be measured. When the projection shows an unusual contour, the comparator operator traces the image on paper and affixes the dimensions.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information is available by ordering the monthly subscription package, order number PB84-926102, price code E02.

0602 Checking Weld Composition: Inconel 718 alloy welds are tested for the presence of filler metals

National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(H, K)*

Electrolytic etching can determine whether certain iron/nickel alloys are welded with sufficient quantities of the desired filler metal. For Inconel 718 alloy, weld beads are abrasively cleaned and then electrolytically etched with a 15 percent by weight hypophosphite solution for 5 seconds at 20 Vdc. After etching, the operator observes whether a yellowish film has accumulated on the weld. If no yellowish deposit is detected, the filler metal is mostly Inconel 718 alloy. If the yellow deposit is present, a filler containing tungsten, molybdenum, or cobalt may be present. (Inconel is a registered trademark of the Inco family of companies).

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-19628/TN.

Chromium Ion Implantation Can Prevent Corrosion in Steel Bearings Used in Navy Aircraft

See 0002

Circuitry for Angle Measurements: An angle resolver is pulsed and read under microprocessor control

See 0457

0603 Classifying Particles by Acoustic Levitation: Separation technique is well suited to material processing

National Aeronautics and Space Administration,
Washington, DC.
Jul 84 *(D, G)*

Different kinds of particles in a mixture are separated by acoustic levitation, according to recent investigations. This adds to the growing list of tasks made feasible by acoustic levitation. The acoustic technique may find applications in fusion-target separation, biological separation, and manufacturing processes in liquid or gas media. The equilibrium position of a particle in an acoustic-levitation field depends on the particle size and shape and upon its interaction with other force fields.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15561/TN.

0604 Coaxial Pipe for Liquid Natural Gas: System provides ultrareliable protection against leaks

Department of Energy, Washington, DC.
Feb 84 *(C, D)*

A report presents the results of a demonstration of a coaxial-piping-system concept for the transport of liquid natural gas (LNG). The results of the demonstration make possible an unconditional recommendation that the coaxial piping system be developed to a state of commercial implementation. The system allows impoundment and vapor-dispersion control without added safety devices. It provides practical, technically-viable, economical, and reliable cryogenic transfer lines for LNG peak-shaving, satellite, and import/export terminal plants.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-003845, price code: A08. For information not in the report, contact Dr. John Cece, U.S. Department of Energy, EP-323, Washington, DC 20545; (301) 353-5486.

0605 Coaxial Redundant Drives: Harmonic drives allow redundancy and high output torque in a small package

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(F)*

Originally developed for positioning an 800-lb X-ray telescope, an electromechanical drive provides high torque and redundancy in a compact package. If the main drive should fail, a standby drive takes over and produces torque along the same axis as that of the main drive. Potential uses include power units in robots for internal pipeline inspection, manipulators in deep submersible probes, or other applications in which redundancy could protect against costly failures. The drive consists of two transmissions and brushless dc motors arranged in tandem in a single assembly. The harmonic transmission offers additional advantages. Tooth friction losses are low because motion is almost purely radial at the points of tooth contact. Many spline teeth are in simultaneous engagement to carry high-torque loads.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to MFS-25171/TN.

0606 Coil-Welding Aid: A positioner holds a coil inside a cylinder during tack welding

National Aeronautics and Space Administration,
Washington, DC.
Feb 84 *(F, G)*

A welding aid spaces the turns of a coil inside a cylinder and applies contact pressure while the coil is being tack-welded to the cylinder. The device facilitates the fabrication of heat exchangers and other structures by eliminating hand-positioning and clamping of the individual coil turns.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB83-925602, price code E02.

0607 Computer Models for IC Fabrication: Process simulations are described for computer-aided design

Army Materiel Development and Readiness Command,
Alexandria, VA.
May 84 *(B, G)*

Physical models of the processes used to fabricate semiconductor-integrated circuits have been developed for the computer-aided design of custom very-large-scale integrated (VLSI) circuits. The models, developed for the U.S. Army Electronics Research and Development Command, can be used to predict the performance and reliability of such VLSI circuits while reducing development-cycle time and cost. Three general fabrication processes were investigated: ion implantation, thermal oxidation, and chemical vapor deposition of silicon..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A117982, price code: A19.

0608 Computer Models for VLSI Fabrication Processes: A completely new, advanced computer program is now available

Army Materiel Development and Readiness Command,
Alexandria, VA.
Sep 84 *(B, G)*

A report describes a recent phase of a program to develop accurate and physically-correct computer models for manufacturing processes for very-large-scale integration (VLSI) circuits. The principal highlight of this phase was the release of SUPREM III, the third generation of a process-modeling program. SUPREM III is a completely new, greatly improved version of the program with substantially improved capabilities. SUPREM III can simulate structures with up to five material layers. Built-in models for single-crystal silicon, silicon dioxide, polysilicon, and silicon nitride are included, and other materials can easily be added with user-defined parameters. A large number of new and improved physical models for oxidation, diffusion, epitaxy, and ion implantation is included in the new program.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A130105/NAA, price code: A05.

0609 Computer-Controlled Laser Welding: Limited access joints in a gas-turbine recuperator are welded using a moving-mirror, computer-controlled CO2 laser

Army Materiel Development and Readiness Command,
Alexandria, VA.
Sep 84 *(G)*

A computer-controlled laser welding system, developed for the U.S. Army Tank-Automotive Command, welds difficult-to-reach joints on gas-turbine-exhaust heat recuperators. The plates used in making this recuperator are 8 mils thick and are difficult to reach with conventional welding systems. Resistance seam welding cannot be used because the heat moves and buckles the thin plates. The new process eliminates this problem by operating at lower energy levels. The welding device that reaches between the plates uses only 9 J/mm. With this equipment about 4,500 recuperator-plate pairs were welded, which was equal to over 20 mi of weld and required 45,000 on/off laser cycles.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A132448/NAA, price code: A06.

0610 Containerless-Processing Module: Specimens are melted, manipulated, and solidified without contact

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(G)*

A proposal is made for a high-temperature, containerless-processing module that positions and melts molten glass or metal without contact with the container wall. The fluid masses are manipulated, stirred, and controlled by acoustic forces. The module provides photographic monitoring and transfer of the solidified specimens to storage bins.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-14932/TN.

0611 Control-Chain Safety Tray and Friction Pull: A sprinkler-system control chain is stored above a suspended ceiling
National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(F)*

A tray mounted above a suspended ceiling keeps a sprinkler-system control chain safely out of the way of pedestrian traffic below yet when needed, the loop of chain that hangs through the slot in the tray may be reached easily by using a fireman's hook, a short stepladder, or a chair, or even simply by jumping up to grasp the chain. The slot in the tray is made of two strips of neoprene that are stiff enough to keep the chain from falling freely but flexible enough to permit the chain to be pulled through when needed. Such a safety tray could be used for infrequently-used control chains on vents and dampers.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB84-925611, price code E02.

0612 Controlling Heat-Exchanger Outlet Temperature: Nearly constant temperature is maintained regardless of fluid flow
National Aeronautics and Space Administration,
Washington, DC.
Aug 84 *(D)*

A bypass channel provides some temperature regulation for the output of a fixed-area heat exchanger. The arrangement was devised to maintain constant-temperature output under varying flow rates. The heat-exchanger surfaces cannot be varied to alter the amount of heat transferred. However, a constant output temperature can be maintained if one stream of fluid is heated to nearly the maximum heat-exchanger temperature, then cooled by mixing it with an unheated stream at the outlet to achieve the desired intermediate temperature.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and a diagram is available by ordering the monthly subscription package, order number PB83-925408, price code E02.

0613 Controlling Industrial Noise: A handbook gives theoretical background and practical advice
National Aeronautics and Space Administration,
Washington, DC.
Feb 84 *(D, H, K)*

A handbook gives basic, comprehensive information on noise in industrial environments. It is intended to aid engineers in understanding, measuring, and controlling noise, whether or not they have experience in acoustics. The basic physics of sound is covered. Such topics as longitudinal propagation, frequency, speed, physical quantities and units, diffraction, and resonance are reviewed. Measurement techniques are described. Instrumentation for sound and vibration measurements is discussed as are noise-and vibration-control materials. Three general types of noise-control procedures are discussed: those implemented at the source, along the transmission path, and at the receiver. An appendix summarizes Occupational Safety and Health Administration regulations and assessment of hearing impairment. A glossary and a bibliography are provided.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: N82-11858, price code: E02.

0614 Controlling Sanding Depth: A mounting fixture for a rotary sander ensures a uniform finish
National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(F, G)*

A sander mounted on a traversing mechanism is moved toward or away from the workpiece by a screw drive. The depth of sanding and the position of the sander on the work is therefore reliably controlled. The sander is useful for surface cleaning of out-of-round parts. It prevents them from being oversanded and thin surface layers from being sanded through -- problems that could arise if sanding depth were controlled manually. It can also be used for finishing flat parts with linear contours and for controlled repair of pores and pits. The sander is an adaptation of a small air-driven grinder.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-19713/TN.

Conveyor Installation Tools
See 0899

Corrosion Inhibitor for Multiple-Metal Cooling Systems: Silicate/nitrite/borate formulation is compatible with aluminum, steel, copper, and other metals
See 0758

0615 Cryogenic Vacuum Pump: System provides high pumping capacity, even for noble gases
National Aeronautics and Space Administration,
Washington, DC.
Sep 84 *(F)*

A three-stage cryogenic vacuum pump has high pumping capacity for all gases, including helium, while requiring only a 2-watt refrigerator to cool its two coldest stages. The pump is small enough for general laboratory use. The first stage, which is cooled by liquid nitrogen, removes water and CO2 from the input gas. The second stage, which is cooled to 38 K by the refrigerator, removes noble gases except helium and some of the lighter gases not trapped by the first stage. The third stage, cooled by the refrigerator, traps all remaining gases. This stage realizes a very high pumping capacity by using a large-area cold surface.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15517/TN.

Damping Seals for Turbomachinery: Seals perform a dual function while permitting higher speeds
See 0766

0616 Design and Fabrication of Composite Tail Rotor Components: Composites provide higher strength and lower weight
Army Materiel Development and Readiness Command,
Alexandria, VA.
Nov 84 *(G, H)*

The incorporation of advanced composite structures in aircraft and other vehicles offers the advantages of decreased weight and lower life cycle costs. Special fabrication techniques are needed, however, to achieve the required structural strength in such applications. In a study sponsored by the U.S. Army Aviation Research and Development Command, methods have been developed for fabricating composite components for a helicopter tail rotor assembly, where unusually high strength and durability are required. One feature of the process is the use of a special bonding mold that can accommodate the precise inner contour of the pitch case while at the same time delivering enough compaction load to secure the bond.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A134277/NAA, price code: A06, or contact project officer Jim Tutka (314) 263-3079.

0617 Design of Multistage Axial-Flow Compressors: Computer program develops blading geometry and performance parameters

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(A, D, F)*

A program has been developed for computing the aerodynamic design of a multistage axial-flow compressor and, if desired, the associated blading geometry input for internal flow analysis. The aerodynamic solution gives velocity diagrams on selected streamlines of revolution at the blade row edges. The program input includes the annulus profile, the overall compressor mass flow, the pressure ratio, and the rotative speed. This program is written in FORTRAN IV for use on a UNIVAC 1110 or an IBM 360-67 computer.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to LEW-13505/TN.

0618 Detecting Defective Solder Bonds: The method is noncontact and nondestructive

National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(B, C, K)*

A technique detects defective solder bonds in a solar array or other large circuit board, using a thermal-imaging camera. The board is placed between a heat lamp and the camera. Poor joints are indicated by 'cold' spots on the infrared image. This technique does not require any physical contact with the board, which is heated only a few degrees centigrade. The thermal images can be stored on a videotape.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25507/TN.

Determining Crystal Orientation by Laser Diffraction: Rapid, accurate method employs inexpensive equipment and requires minimal sample preparation

See 0962

0619 Determining Normal-Distribution Tolerance Bounds Graphically: Graphical method requires minimal calculations and table lookup

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(J)*

The tolerance boundaries for a normal statistical distribution may be established from only three points: the mean upper and lower confidence bounds and the lower confidence bound of standard deviation. The method requires only a few calculations with simple equations; extensive table lookup is unnecessary. It is accurate enough for graphical analysis at any confidence level and any range of distribution percentile. The new method allows conservative predictions of reliability, life expectancy, performance, and other characteristics of components.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20115/TN.

Determining the Orientation of Anisotropic Materials: Ultrasonics probe the direction of tile fibers

See 0466

Dielectric Scanning Locates Voids in Glass Foam: Capacitive probes may succeed where X-ray and ultrasonic equipment do not

See 0471

0620 Distributed Data Processing in Manufacturing: Departmental minicomputers connected to a large host computer can increase productivity

Department of Energy, Washington, DC.
Nov 84 *(A, G)*

A report describes the Computer-Aided Control, Tracking, and Updating System (CACTUS) developed for managing work in process. Initially used for cable assembly, CACTUS is being expanded to include additional electronics manufacturing operations because of the productivity gains it offers. The philosophy of CACTUS is to add distributed data processing to the centralized data processing system used for control of work. The chain of communications between the host computer and the cathoderay-tube terminals in a manufacturing department is severed. A minicomputer in the department communicates directly with the central system, and departmental communication is carried out with the minicomputer.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-010519/NAB, price code: A04.

0621 Drilling Precise Orifices and Slots: A combination of mechanical drilling and EDM is used

National Aeronautics and Space Administration,
Washington, DC.
Mar 84 *(F, G)*

Machinists working on the Space Shuttle reaction-control system have used numerical control and electri-discharge machining in a tooling combination that could save time and labor in other applications as well. whereas an experienced machinist was previously tied up full time drilling a complex set of orifices, the new tooling system is operated by one person without special machining skills. Moreover, it automates the production of identical parts so that several are completed in less time than it previously took to fabricate one part.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20053/TN.

0622 Economic Analysis of Bearing Refurbishment: Restoring used bearings can provide substantial savings

Army Materiel Development and Readiness Command,
Alexandria, VA.
Aug 84 *(F, G)*

The results of a study are available on the economic impact of implementing bearing-refurbishment systems for restoring bearings taken from overhauled vehicles for reuse. The report was prepared for the U.S. Army Aviation

Research and Development Command. The basic elements of a bearing refurbishment system include a bearing diagnostic subsystem for the inspection and selection of bearings for rework, the overhaul and reworking subsystem containing the required plating and grinding equipment, and an inventory-management subsystem for controlling the total inventory of a given shop.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A114811/NAA, price code: A09, or contact project officer Joe Pratcher (314) 263-3079.

0623 Economic Model Assesses Benefits of Improved Test Accuracy

Department of Commerce, Washington, DC.
Oct 84 *(B, K)*

An economic model was developed to calculate the benefits of improving the quality of measurements made in maintenance or production testing programs. The model will assist managers in assessing the value of improving the accuracy of electronic test equipment, especially 'automatic test equipment' (ATE). NBS researchers say it also can be applied easily to many other types of testing situations. ATE includes a wide variety of complex, computer-controlled systems that perform high-speed tests of individual electronic components, circuits, or even entire electronic assemblies. The ATE systems are used by manufacturers and customers to test everything from television sets to aircraft guidance equipment and sophisticated military weapons systems. The model may be used when normal probability distributions can be assumed for both the product variable and the testing equipment measurements and when the quality of the product that is being tested is a continuous variable (for example, electrical resistance). That is, the model does not apply directly to the testing of a switch that either works or doesn't work. However, it would apply to those critical continuous measurements that are often included in switch testing.

FOR ADDITIONAL INFORMATION: Details of this method of economic analysis are provided in a new publication form NBS, Economic Model of Calibration Improvements for Automatic Test Equipment (SP 673). This report explains the derivation of the model, provides examples of its use, and includes a short FORTRAN program which implements the model. Copies are available for $3.25 prepaid from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Order by stock no. 003-003-02580-1.

Eddy-Current Damage Test for Carbon Composites: A nondestructive test method detects cracks in materials of low conductivity

See 0475

0624 The Effects of Porosity in Welds: Five different levels of porosity are studied

Army Materiel Development and Readiness Command,
Alexandria, VA.
Jun 84 *(G, H)*

A study, conducted for the U.S. Army Materials and Mechanics Research Center, examined to what extent flaws affect the operational service life of high-strength steel welds. The study was also aimed at establishing process parameters for producing controlled porosity and optimum procedures for ultrasonic inspection of the porous welds. Controlled porosity was produced in butt-weld joints of 0.75 in. thick steel plates by selective adjustments of shield-gas composition, gas-flow rate, electrode-wire feed, and voltage. The five levels of porosity studied included clear, fine, medium, large, and assorted. The fatigue life of the samples, including uniaxial fatigue and fracture toughness, was determined by mechanical tests.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A124668, price code: A05, or contact project officer Robert H. Brockelman (617) 923-3333.

0625 Electric-Discharge Machining of Thin Slots: By promoting oil-bath circulation, new method allows 0.01-in. slots to be cut

Department of Energy, Washington, DC.
Oct 84 *(F, G)*

A diecutting method allows the extrusion of extremely thin ribbons of metal. The method was developed for producing foils of sodium or lithium -- materials that are highly reactive to air or moisture and therefore require special handling. The extrusion die is cut by electric-discharge machining, with special provision for removing material from the fine cut.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PAT-APPL-6,326,087/NAB, price code: A02. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For further information, contact: Edward F. Lewandowski, Argonne National Laboratory, 9700 South Cass Avenue, Argonne, IL 60439; (312) 972-4405.

0626 Electrochemical Deburring: Machining burrs are removed from inaccessible areas

National Aeronautics and Space Administration,
Washington, DC.
Feb 84 *(F, G)*

A special electrochemical deburring tool is used to remove machining burrs from assembled injector tubes. Conventional deburring methods could not be used because of the close proximity of the tubes. The apparatus involves a direct-current power supply, an electrolyte, the deburring tool, and electrical connections between the tube to conduct electricity. The electrolyte flow also drags away the by-products of the chemical reaction. Because of electric-field concentration at sharp edges, electrochemical deburring works mainly at the rough edges of a workpiece and does not signifiicantly affect the nominal dimensions of the workpiece.

FOR ADDITIONAL INFORMATION: Inquiries concerning rights for the commercial use of this invention should be addressed to Leon D. Wofford, Jr. George C. Marshall Space Flight Center, Mail Code: CC01, Marshall Space Flight Center, AL 35812; (205) 453-0020. Refer to MFS-19693/TN.

0627 Electrochemical Deburring: The technical and economic capabilities of the process are characterized

Department of Energy, Washington, DC.
Apr 84 *(G)*

Electrochemical deburring is a fast, low-cost method for removing machining burrs from miniature parts and assuring edge sharpness, according to research that analyses the process in detail. The process involves applying a voltage between the workpiece and a specially designed electrode with an electrolyte flowing in between. The process is an effective alternative to manual deburring, which is time-consuming, dependent on operator skill, and restricted to easy-to-reach areas.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order: An Analysis of Electrochemical Deburring(DE82-020881), Electrochemical Deburring(DE81-025609), and Tooling for Electrochemical Deburring(DE81030190); price codes: A08, A05, and A04.

0628 Electrodeposition Repair of Damaged Metal Parts: Damaged material is replaced by electrodeposited copper

National Aeronautics and Space Administration, Washington, DC.

Oct 84 *(G)*

Damaged combustion-chamber coolant channels are repaired by a process that includes the electrodeposition of new metal in areas that are cracked or gouged. A similar technique could be used to repair other metal parts, provided that the metal to be electrodeposited has physical properties nearly identical to those of the original material. The restoration process requires several machining and plating operations.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for the commercial use of this invention should be addressed to Marvin F. Matthews, Lyndon B. Johnson Space Center, Mail Code: AL-3, Houston, TX 77058; (713) 483-4871. Refer to MFS-19783/TN.

Electrolytic Sharpening of Diode-Contact Whiskers: Phosphor bronze wire is pointed without highly-toxic chemical reagents
See 0239

Electronic Dilatometer: A nonclamping micrometer measures small strains
See 0479

Electronic Force Gage for Welders: Welding force is monitored in process
See 0480

Electronically-Scanned Pressure Sensors: Sensors do not have to be pneumatically switched
See 0481

0629 Electroplating Small Particles: Particles are kept in motion near the cathode while they are plated

Department of Energy, Washington, DC.

Feb 84 *(G)*

A new electroplating apparatus ensures smooth coatings of uniform thickness on very small objects that are ordinarily difficult to manipulate and control in electroplating systems. The apparatus was developed for plating metals on microsphere targets for nuclear fusion; such targets are only 80 to 100 micro m in diameter. The key to the new method is the controlled vibration of the microspheres, which ensures that they are maintained in random, free vibration. The cathode consists of a resilient wire screen having a mesh size finer than the microspheres. The glass microspheres to be plated are deposited in the chamber, and plating solution flows downward into the chamber. The cathode is vibrated by a rod, which is actuated by a frequency generator and an electro-mechanical transducer.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,316,786, which is available from: Commissioner of Patents, Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. DOE, Washington, DC 20585.

0630 Electrostatic Levitator With Feedback Control: Sample position is automatically maintained

National Aeronautics and Space Administration, Washington, DC.

Jun 84 *(G)*

An electrostatic levitation system includes a closed feedback loop to hold the levitated object at the desired position. The vertical position of the object is sensed and compared with the preset value. When a position error is detected, the amplitude of the levitating field is increased or decreased to restore a zero error. The system offers a number of options that lend themselves well to containerless processing.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15553/TN.

0631 Estimating Pump Blockage: Blockage can be predicted for all components, including inducers, impellers, and diffusers

National Aeronautics and Space Administration, Washington, DC.

Nov 84 *(D, F)*

A semiempirical approach for estimating blockage factors for pump passages improves the accuracy of calculations of pump performance. This method improves on the current estimation methods based solely on subjective engineering judgment. A blockage distribution obtained by the semiempirical method was used in a centrifugal-pump-loss program for several Space Shuttle main-engine pumps..

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-19763/TN.

Evaluation of Forklift Trucks: Four different types of forklift trucks are evaluated for productivity and economy
See 1011

0632 Evaluation of High-Efficiency Particulate Air Filters: Structural test results characterize ventilation filters for nuclear facilities

Department of Energy, Washington, DC.

Apr 84

The response characteristics and structural limits of high-efficiency particulate air (HEPA) filters were determined under simulated tornado conditions. HEPA filters, commonly used in the nuclear industry to remove dust from the incoming ventilative air, consist of folded sheets of intertwined glass fibers enclosed in a plywood frame measuring 24 by 24 by 12 in.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-013815, price code: A06. For information not in the report, contact William S. Gregory, Los Alamos National Laboratory, Q-6, MS G-777, Los Alamos, NM 87545; (505) 667-6231.

Evaluation of Steam Generators for Oil Wells: Downhole steam generation appears to be effective, but corrosion is a problem
See 0908

0633 Expander for Thin-Wall Tubing: A tool locally expands small-diameter tubes
National Aeronautics and Space Administration, Washington, DC.
Oct 84 *(F)*

Originally developed to expand a liquid-oxygen tube fitting, an easily constructed tool uses an elastomer to expand a section of thin-wall, small-diameter tubing. The tool is readily adaptable to other situations in which a tube must have a small bulge for mechanical support or flow control. A metal sleeve with a diameter slightly smaller than that of the tube slides on a metal rod. One end of the rod widens to a flange of the same diameter as that of the metal sleeve. An elastomeric sleeve is placed on the rod between the metal sleeve and the metal flange. When the metal sleeve is pushed axially toward the flange, the elastomeric sleeve is squeezed and acts somewhat like a hydraulic fluid. The resulting pressure forces the tube wall outward.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for the commercial use of this invention should be addressed to Leon D. Wofford, Jr., George C. Marshall Space Flight Center, Mail Code: CC01, Marshall Space Flight Center, AL 35812; (205) 453-0020. In either case refer to MFS-19739/TN.

0634 Extremely Accurate Robotic Movement Module is Demonstrated
Department of the Air Force, Washington, DC.
Nov 84 *(F, G)*

A three-dimensional vision system for robotics was demonstrated recently as part of an advanced robotics program to improve technologies for aerospace manufacturing. The system is incorporated in a differential accuracy module for use on a robotic arm to make possible precision movement for the arm from place to place. The module itself is being demonstrated on a Cybotech gantry robot manufactured in Indianapolis and uses a three-dimensional volumetric vision system. This vision system is a great advance over currently-used vision systems that have only two-dimensional sight. The vision system is applicable to a whole range of assembly operations, and it makes possible fixtureless assembly. The project is making significant contribution to the technology of programming robots accurately off-line, and thus dramatically increasing their productivity. The module includes the vision system and processing electronics. The vision sensor can be mounted on the end of the robot arm or be placed near the work piece in a fixed position. The vision sensor is able to gather and interpret position and orientation data directly from the workpiece and feed this information to the robot controller. This allows the robot to know where it is relative to the workpiece and to maintain a high degree of accuracy. Such extremely precise data makes it possible to use the robotic arm for fixtureless drilling as well as other assembly operations, because the robot can judge for itself the precise location where it needs to drill and no longer has to rely on fixtures to hold the workpiece position.

FOR ADDITIONAL INFORMATION: Contact: Jo Anne Rumple at the United States Air Force Aeronautical Systems Division, ASD/PA, Wright-Patterson AFB, Ohio 45433; (513) 255-2725. Refer to PAM 84-098/TN.

Fabricating Slotted-Waveguide Arrays From Sheet Metal: Low-cost lightweight waveguides are formed from rolls of aluminum
See 0246

Fabrication of Graphite/Epoxy Column Elements: Dimensionally precise columns are wound on vertical mandrels
See 0776

Fabrication of Structural Cellular Glass: A surface layer is quickly heated and compressed
See 0777

0635 Fast Closing Valve For Ultrahigh Vacuum Service
Department of Energy, Washington, DC.
Mar 84 *(F)*

A valve protects storage ring vacuum from sudden vacuum failures which may occur in experimental beamlines. It is triggered by a capacitor driven solenoid, and has a closing time of 3 - 5 msec. It is remotely resettable, and of all metal construction. This device is unique in that it can close an aperture of about 3/4 x 6 inches, in this short time interval. It may be used in similar lightsource applications or in general high vacuum systems. Possible uses for containment systems to help isolate ultra-clean, chemical or biological environments.

FOR ADDITIONAL INFORMATION: Contact: W. Marcuse, Office of Research and Technology Assessment, Brookhaven National Laboratory, Upton, Long Island, NY 11973; (516) 282-2103.

0636 Fatigue Strength of Pressurized Cylinders: Prestressing is found to improve fatigue resistance
Army Materiel Development and Readiness Command, Alexandria, VA.
Oct 84 *(D, H)*

The behavior of pressurized cylinders with multiple internal cracks has been studied with a view toward predicting failure. Thick-walled cylinders containing more than one internal crack were compared with one containing a single crack. The crack growth and strain behavior showed that one of the multiple cracks becomes dominant and controls failure. Monitoring the circumferential strain over the dominant crack gives an indication of when failure is imminent. The study, made by the U.S. Army Armament Research and Development Command, found that the strain behavior of cylinders containing multiple notches or cracks is in fact similar to the single-notch case and may be analyzed the same way.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A136104/NAA, price code: A03, or contact project officer F. J. Throop (518) 266-5124.

0637 Fine-Line Pattern Processing for Photoresist Films: High resolution is obtained in 25-micro m thick resists
Department of Energy, Washington, DC.
Nov 84 *(B, C, G)*

Several types of photoresists and photoprocessing methods have been evaluated for use in pattern plating hybrid thin-film networks (TFNs) and solar-cell conductors. Fine-line patterns were produced in thick resists which allowed conductor plating to aspect ratios less than one; pattern plating also eliminates the need for precious metal reclamation required with conventional etched conductors. Four types of photoresists were studied in an attempt to pattern fine lines in resists thick enough for solar cell and TFN applications.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-006810/NAB, price code: A02. For information not in the report, contact David Norwood, Sandia National Laboratories, Division 2122, Albuquerque, NM 87185; (505) 844-1532.

0638 Flexible Coupling for Angle Transducer: Flexure strips ensure parallelism between input and output shafts

National Aeronautics and Space Administration,
Washington, DC.
Mar 84 *(K)*

A precise flexible coupling for an angular-displacement transducer compensates for misalinement and prevents the pivot reaction force from twisting its members into the undesired one of two stable configurations. The coupling is essentially a gimbal mounting that behaves as a four-bar linkage. It creates a remote phantom pivot point that remains stationary for small displacements of the coupling.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15412/TN.

0639 Flexible Manufacturing Systems: Strategies for improving productivity with computers are presented

Army Materiel Development and Readiness Command,
Alexandria, VA.
Nov 84 *(G)*

An overview is available on the implementation and impact of computer-control systems to manufacturing operations that fall in the middle ranges of production between specialty, one-of-a-kind shops and large volume, mass-production shops. The overview, prepared for the U.S. Army Tank-Automotive Command, represents an executive summary for a five-volume handbook on this technology, known broadly as flexible manufacturing systems (FMS). The principal components of an FMS include standard numerically-controlled machine tools; a conveyance network to move parts or tools between machines and fixturing stations; and an overall control system that coordinates the machine tools, the parts-moving elements, and the workpieces.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A127927/NAA, price code: A02.

0640 Focal-Plane-Array Optical Proximity Sensors: Objects are detected at beam-axis intersections

National Aeronautics and Space Administration,
Washington, DC.
Jun 84 *(J, K)*

A proximity-sensing system originally developed to trigger the braking system of an automatically controlled car should be useful in industrial situations requiring three-dimensional location or detection of objects. The system includes an array of light sources and receivers that respond when a reflecting object intercepts one or more light beams at a specified range. The system consists of several illuminator boxes and detector boxes. For the automatically controlled car, the boxes are mounted along the front bumper. Proximity to an object is sensed when one or more beams from the illuminator boxes strike the object and reflect into one or more detector boxes.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15155/TN.

Foil-Resistance Strain Gages: Annealed-constantan, high-elongation gages are used to measure large strains with errors of only a few percent

See 0486

0641 Fuel-Saving Oil Burners for Homes: Two approaches to improving the efficiency of furnaces and adapting them to lower heat demands are described

Department of Energy, Washington, DC.
Nov 84 *(C, D)*

More efficient home oil burners are the subject of two reports. Conventional burners do not burn oil completely and cannot respond to low-load demands. The new burners described in the reports overcome these problems. The first report deals with a Schladitz fuel injector which is added to the oil burner. In the injector, No. 2 fuel oil flows over heated steel whiskers. The other report describes a completely new burner intended for installation in new houses or in old houses that have been newly insulated and weatherstripped. The burner heats air for combustion by mixing it with recirculating combustion gases.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order numbers: DE83-001260/NAB and DE83-001259/NAB, price codes: A03 each. For information not in the reports, contact L.M. Woodworth, Brookhaven National Laboratory, Upton, NY 11973; (516) 282-2361.

Gage Measures Recessed Gaps: Tool permits fast and easy measurements

See 0487

0642 Gas-Bearing Crucible for Shot Tower: Device protects molten drops

National Aeronautics and Space Administration,
Washington, DC.
Jun 84 *(G)*

A perforated crucible supports molten drops on a cushion of air, allowing them to assume nearly spherical shape. The crucible introduces the drops into an evacuated tower where they harden as they fall. Since the drops fall through vacuum, they are not distorted by air resistance and therefore they retain their shape as they harden. The crucible/tower combination can be used to fabricate targets for thermonuclear power experiments and spherical cavities for lasers.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15070/TN.

0643 Gas-Jet Meniscus Control in Ribbon Growth: Analysis finds jet parameters to control thickness of ribbon pulled vertically from melt

National Aeronautics and Space Administration,
Washington, DC.
Mar 84 *(G, H)*

The use of a gas jet has been proposed to control the shape of the meniscus and thus to regulate ribbon thickness in vertical silicon-ribbon growth. The gas jet would also cool the ribbon, increasing the maximum possible pull speed. The meniscus shape and stability has been analyzed for various jet geometries. The gas-jet method is meant to replace the method in which the thickness is controlled by pulling the ribbon between two flat plates.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-14978/TN.

0644 Gas-Pressure Sintering Process: High-performance silicon nitride ceramics are produced

Army Materiel Development and Readiness Command, Alexandria, VA.

Jan 84 *(G, H)*

A two-step gas-pressure sintering process (GPS) has been developed for producing ceramic components in near-net-shapes for high-temperature, high-strength automotive gas-turbine applications. The work was conducted for the U.S. Army Materials and Mechanics Research Center. Previously, silicon nitride components were produced by hot-pressing, which does not offer the capability of producing complex shapes, and reaction bonding, which can provide intricate shapes but produces material with poor oxidation behavior. Several sintering studies, ranging from the effects of soaking temperatures in the first and second steps to crucible effects, were conducted to establish optimum conditions for densifying silicon nitride and achieving good thermomechanical properties.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A116121, price code: A04, or contact project officer George A. Gazza (617) 923-3000.

Gas-Temperature Measurement With Minimal Perturbation: Heat-flux transducers determine the temperature of hot, high-velocity, turbulent gases
See 0488

Hardening Iron-Based Nickel/Cobalt/Titanium Alloys: Hardness depends on the titanium content and the type of heat treatment
See 0785

0645 Heat-Treating Gears by Laser: The procedure, which offers big savings in equipment and labor, is feasible but needs development

Army Materiel Development and Readiness Command, Alexandria, VA.

Jan 84 *(F, G)*

A report contains results of a program to surface-harden spur gears with a laser and compare their performance with that of conventional carburized gears. A system was developed for controlling the laser coverage of the gear teeth. Surface hardening by laser appears feasible, but several problems remain to be solved. The program was conducted for the U.S. Army Aviation Research and Development Command. The coverage-control system involves splitting a laser beam into four beams, integrating them into three beams, and directing these beams at the root and adjoining flanks of a tooth gap.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A114670, price code: A06 or contact project officer Richard Mulliken (804) 878-3977.

High-Density Printed Wiring: Channel plating provides thin, closely spaced conductors
See 0252

0646 High-Speed Metal Removal: Ceramic inserts provide higher cutting speeds and longer life

Army Materiel Development and Readiness Command, Alexandria, VA.

Aug 84 *(F, G)*

An investigation by the U.S. Army Armament Research and Development Command compared cutting tools used in machining AISI 1340, 4140, 4340, and HF-1 steels. The objective of this investigation was to determine the metal cutting characteristics of the newer, commercially available tools and to compare their performance with standard tungsten carbide tools. The study focused on tool wear as the determinant of tool life in a comparison between the ceramic-coated tungsten carbide bits and hot- and cold-pressed ceramic inserts. The tests were made at different machining parameters on all four types of steel.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A122282/NAA, price code: A15, or contact project officer Raymond Pohl (201) 328-2295.

0647 High-Temperature, High-Pressure Heat Exchanger: Gas-to-gas exchanger uses a molten transfer medium

Department of Energy, Washington, DC.

Mar 84 *(D)*

A heat exchanger operates efficiently and reliably at high temperatures and large pressure differentials of up to 2,500C or more and several atmospheres, respectively. The new exchanger transfers heat from one gas to another through a liquid medium. The exchanger includes a closed loop containing the liquid medium.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-020876, price code: A03. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. DOE, Washington, DC 20585. For other information, contact Greg Berry, Argonne National Laboratory, 9700 South Cass Avenue, Argonne, IL 60439; (312) 972-6160.

0648 Holder for Fragile Parts: A fixture with many springfingers holds irregularly-shaped parts

National Aeronautics and Space Administration, Washington, DC.

Oct 84 *(F)*

Designed to hold glass ampoules in a furnace, a gripping fixture has hundreds of springfingers each of which applies a minute force. The total force approximates hydrostatic pressure, resulting in a well-distributed load that maintains a firm grip without high stress concentrations. Because the loading forces are distributed over the surface of the object and the spring contacts are flexible, the fixture is a good holder for irregularly-shaped fragile objects. Applied to industrial robot manipulators, the fixture could enhance the ability to grasp delicate parts. The gripper consists of a set of spring rings set in a metallic sleeve. For high thermal conductivity, the spring rings may be made of beryllium copper or bronze.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and a diagram is available by ordering the monthly subscription package, order number PB83-925610, price code E02. Inquiries concerning rights for the commercial use of this invention should be addressed to Leon D. Wofford, Jr., George C. Marshall Space Flight Center, Mail Code: CC01, Marshall Space Flight Center, AL 35812; (205) 453-0020. Refer to MFS-25772/TN.

0649 Holding Tubes in Place for Brazing: Simple method prevents loosening due to thermal mismatch

National Aeronautics and Space Administration,
Washington, DC.
Jun 84 *(F, G)*

Mechanical deformation produced by a special tool temporarily locks tubes in place while they are brazed to a manifold. The deformation is large enough to exceed any differential expansion between the tubes and the manifold. Normal claming tubes can be time consuming and costly if many tubes are to be brazed.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-19658/TN.

0650 Hole-Center Locating Tool: Tool alines the center of a new hole with that of an existing hole

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(F)*

A tool that resembles a C-clamp insures that the center of a newly drilled hole exactly matches the center of an existing hole. The tool requires no cumbersome measurements to insure this match. It can be used for field installations, where reference points may be unavailable or where the work area is cramped and not easily accessible with conventional tools. The tool consists of a three-sided frame with a rod end that can be slipped into the existing hole. A punch is located above this rod end. The material to be drilled slips between the two while bolts secure the device in place. The required hole center is marked by the punch.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB84-925611, price code E02.

0651 Hollow-Sphere Production Line: After initial formation, spheroids are processed without the contaminating touch of solid objects

National Aeronautics and Space Administration,
Washington, DC.
Aug 84 *(G)*

A proposed scheme for contactless handling and fabrication would allow fusion-target pellets to be manufactured automatically at a fusion powerplant. The scheme also has potential for the manufacture of precise microcapsules for catalysts and medications. The reproducible wall thickness, size, and sphericity of the contactless-handling technique would yield uniform dissolution rates. A spheroid in process is supported by acoustic levitation at each work station and is transported between stations by a combination of acoustic levitation and acoustic propulsion.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to Paul F. McCaul, NASA Resident Office-JPL, Mail Code: 180-601, 4800 Oak Grove Drive, Pasadena, CA 91103, (213) 354-2700. In either case refer to NPO-15592/TN.

Hot Isostatic Pressing (HIP) Technique Can Improve Certain Alloys Used in Aircraft Engine Turbine Blades

See 0164

0652 Hot-Melt Adhesive Attachment System: An adhesive system is effective on Earth and in space

National Aeronautics and Space Administration,
Washington, DC.
Feb 84 *(G, H)*

A hot-melt adhesive attachment system works as well in vacuum as it does at atmospheric pressure. The new system uses electronic heaters to warm a fiberglass cloth impregnated with a hot-melt adhesive. When the adhesive reaches melt temperature, the head it is on may be attached to metals, composites, ceramics, and other materials. Once it is attached, the head is cooled rapidly for a quick stick. For normal release, current is again applied to the electronic heaters to melt the adhesive. For emergency release, current is applied to a thermo-electric cooler/heater to melt the adhesive. It can be used to tether tools or to attach temporary scaffolding to walls, buildings, or beams.

FOR ADDITIONAL INFORMATION: For licensing information, contact Howard J. Osborn, Langley Research Center, Mail Code: 279, Hampton, VA 23665; (804) 827-3725. Refer to LAR-12894/TN.

Improved Connector Shell for Cable Shields: Braid is gripped around its entire circumference

See 0257

0653 Improved Electrostatic Optical System: The device is suitable for molecular epitaxial formation of semiconductor components

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(J, K)*

A chromatically- or spherically-corrected electrostatic lens focuses a molecular beam down to a spot the size of 1 micron. The beam is suitable for drawing doping patterns on semiconductor crystals and for fine-line etching of microelectronic patterns. The beam energy is only about 1 percent of implantation energy, so substrate damage is minimal. The improved electrostatic lens system uses a cylindrical mirror as the central element between two tubular lenses. Aberrations introduced by the mirror tend to cancel those introduced by the tubular lenses. The result is an order-of-magnitude improvement in chromatic or spherical compensation.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15774/TN.

Improved Magnetostrictive Materials Developed

See 0495

0654 Improved Silicon-Growth Chamber: Improvements include a better transport mechanism and a better trough heater

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(G, H)*

A silicon-growth technique, based on coating ceramic substrates with a thin layer of molten silicon that solidifies to form a polycrystalline film, was modified to produce solar-cell quality silicon sheet. The modification includes a new transport mechanism that uses a series of graphite rollers to move the substrate in and out of the coating chamber, and a longer trough heater.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15237/TN.

Improving a Guarded Hotplate: A modified outer guard ring is heated more uniformly
See 0498

0655 Improving Control of Remote Manipulators: Commands and sensor signals are processed by computer to improve performance feel

National Aeronautics and Space Administration,
Washington, DC.
Jun 84 *(F, G)*

Advanced theoretical and experimental developments in the field of remote manipulators are discussed in a conference preprint. The broad unifying concept that distinguishes advanced systems is that the performance of a remotely controlled manipulator can be improved by having the manipulator itself affect the control signals. This concept is applicable for improving the performance of manipulators and robots in hazardous areas, underwater, or in many other commercial applications.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15049/TN.

Improving Flat-Cable Manufacturing: Cable rejection rate is reduced by almost half
See 0260

0656 Improving Trace-Ion Sensitivity: Background noise is reduced by some special precautions

National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(J, K)*

Special precautions minimize contamination in trace-ion detection systems, improving quality control in a host of production operations, including integrated-circuit fabrication, lens fabrication, and vacuum-tube assembly. When used with one commercial contamination detector, the procedures increase sensitivity by 25 percent overall and nearly double it for small samples. The new technique--really a way of reducing background noise--applies to a standard setup for measuring the contamination of integrated circuits and other components, in which a 'clean' solution is passed over the component, and the solution resistance is monitored.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information is available by ordering the monthly subscription package, order number PB84-926012, price code E02.

0657 Initial Graphics Exchange Specification For Solid Models Is Extended

Department of Commerce, Washington, DC.
Dec 84 *(A, D, G)*

A proposal that would extend the Initial Graphics Exchange Specification (IGES) for CAD/CAM systems to include solid models has been released for a one-year trail. The Experimental Solids Proposal (ESP) defines an IGES data file format for the exchange of CAD data that use solid geometry to define objects. Both boundary representation (BREP) and constructive solid geometry (CSG) models may be represented under the ESP format. The ESP is supported by the Computer Aided Manufacturing International (CAM-I) Geometry Modeling Project.

FOR ADDITIONAL INFORMATION: Contact: IGES Coordinator, National Bureau of Standards, A353 Metrology Building, Gaithersburg, MD 20899.

0658 Inspecting Ingots and Preforms Prior to Hot Forging: Focused ultrasonic beams quickly and rapidly test steel ingots before rotary forging

Army Materiel Development and Readiness Command,
Alexandria, VA.
Oct 84 *(G, K)*

A semiautomatic, nondestructive method was developed by the U.S. Army Armament Research and Development Command for testing steel ingots and preforms used in a forging process. The main problems that had to be solved were the slightly convoluted surfaces of the ingots and facets and indentures in the preforms, which resulted in an uneven transfer of the ultrasonic energy. The finished equipment is able to detect a three-sixty fourths of an inch in diameter longitudinally-oriented flat-bottom hole perpendicular to the longitudinal center line.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A132949/NAA, price code: A02, or contact project officer Vito Colangelo (518) 266-5517.

0659 Integrally Cast Rotors for Turbines: The cost of machining separate rotor blades can be avoided

Army Materiel Development and Readiness Command,
Alexandria, VA.
Jul 84 *(F, G)*

Research conducted for the U.S. Army Tank-Automotive Command, examined precision casting of parts having very thin leading and trailing edges. The parts are rotors for the low-pressure stages of a gas-turbine engine. Previously, the rotors were made as separately-bladed assemblies and required extensive precision machining and grinding. Cost savings could be achieved if the compressor stages were integrally cast to eliminate many machining operations. A preliminary design was developed for the low-pressure compressor that incorporated the first and second stages as castings. A detailed design and performance analysis of these castings was conducted.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A127633/NAA, price code: A06, or contact project officer Donald Cargo (313) 574-6065.

0660 Integrated Computer Aided Manufacturing (ICAM) Quality Assurance Modeling and Analysis Assures Quality Products

Department of the Air Force, Washington, DC.
Sep 84 *(G)*

A new quality assurance modeling and planning method is saving the Air Force millions of dollars this year and will save progressively more in future years. The method assures quality products, with emphasis on quality requirements that are verifiable and reproducible. The ICAM has been recognized as one of the past year's top ten examples of manufacturing technology successes. The project provides an analysis of quality modernization initiatives at aerospace manufacturing facilities and recommends quality assurance managements standards. Over 40 companies and DOD organizations reviewed and critiqued the results. The results are a quality assurance architecture that can be used to plan, manage and integrate requirements for new quality technology initiatives with computerized systems for manufacturing and design activities.

FOR ADDITIONAL INFORMATION: The documents resulting from this project can be obtained by writing to AFWAL/MLTC, attn: Capt. R.R. Preston, Wright-Patterson AFB, Ohio, 45433.

0661 Interstitial Collimating Holes for Gas-Levitation Microfurnace: Spaces between small rods direct gas flow

National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(G)*

The flow-collimating head for a gas-levitating microfurnace is fabricated by a precise yet relatively inexpensive method. The head straightens the flow of gas and renders it laminar by directing it along the spaces between thin, parallel, packed rods or wires. In the new technique, a block is milled to form a square-cross-section groove of the size required for the tight square-array packing of the rods or wires. In this case, 16 rods of 0.020-in. diameter and 1/2-in. length are used. The technique is clearly applicable to a wide variety of array dimensions, array shapes, and hole sizes.

FOR ADDITIONAL INFORMATION: Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to Leon D. Wofford, Jr., George C. Marshall Space Flight Center, Mail Code: CC01, Marshall Space Flight Center, AL 35812; (205) 453-0200. Refer to MFS-25829/TN.

0662 Ionic Refrigerator: With no moving parts, a proposed refrigerator would have a long life

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(C, D)*

A refrigerator is proposed that would have a long lifetime because it would have no moving parts. The thermal energy of the refrigeration process would be transported by hydrogen ions that go through three phase changes in absorbing heat and three phase changes in dissipating heat. Hydrogen would be vaporized, dissociated, and ionized on the anode side of a solid polymer electrolyte, where it would absorb heat from its surroundings. The ions then conduct through the electrolyte to the cathode side, where they are deionized, recombined, and condensed, giving off heat. The energy released on the cathode side is then conducted to a heat sink or radiated away.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15288/TN.

J-Channel Locks Potting to Compression Panel: Panel ends are supported to prevent edge failure during testing

See 0503

Jet Engines as High-Capacity Vacuum Pumps: A large diffuser operational envelope and long run times are possible

See 0165

0663 Kinematic Errors in Spiral Bevel Gearing: Analysis reveals sources of error and how they can be corrected

Army Materiel Development and Readiness Command,
Alexandria, VA.
May 84 *(F, G)*

A report, prepared with the participation of the U.S. Army Aviation Research and Development Command, presents an analysis of kinematic errors in spiral bevel gear trains. The analysis concentrates on errors caused by the generation of nonconjugate surfaces, by axial displacement, and by eccentricity. Such errors are induced during manufacturing and assembly. Two mathematical models of spiral bevel gears are included in the investigation. One model corresponds to motion of the contact ellipse across the tooth surface (geometry I) the other corresponds to motion of the contact ellipse along the tooth surface.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A120808, price code: A03 or contact project officer John J. Coy (314) 263-1625.

0664 Latching Mechanism for Umbilical Connectors: Connectors for power, data, and coolant are automatically mated

National Aeronautics and Space Administration,
Washington, DC.
Apr 84 *(F)*

A proposed electromechanical interface would transfer electric power, data, and coolant from one system to another. Originally suggested for spacecraft, the concept may also be adaptable to underwater connections.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB83-925604, price code E02.

Level Sensor for Cryogenic Fluids: Comparator circuit is used with a hot-wire sensor

See 0507

0665 Lock for Tube Fittings: Covers for the fitting nuts engage to secure the fittings

National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(F)*

An attachment for the nuts of tube fittings locks the fittings securely. The attachment includes covers for the nut on the tube fitting and the nut on the boss fitting. Serrations within the two covers engage so that they mate and lock; this in turn locks the tube fitting. To disengage the nut covers, the tube-fitting cover is pulled away from its mating nut cover. The nut covers can be adapted to any type of tube fitting.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries about licensing should be addressed to Leon D. Wofford, Jr., George C. Marshall Space Flight Center, Mail Code: CC01, Marshall Space Flight Center, AL 35812; (205) 453-0020. In either case refer to MFS-25964/TN.

0666 Lockhopper Valves for Coal Gasifiers: Better valves are under development

Department of Energy, Washington, DC.
Dec 84 *(D, F)*

A lockhopper-valve testing and development project obtained lockhopper systems to withstand the high-pressure and high-temperature environments of coal gasification and pressurized, fluidized-bed combustion processes. Goals of the project were to extend the service capability of lockhopper valves to 25,000 cycles of operation at process pressures up to 1,500 psig and temperatures to 1,200F. To develop valves to meet the standards of the project, extensive lockhopper test simulators were constructed at the Morgantown Energy Technology Center. The facilities include a valve static-test unit, a valve dynamic-test unit, a hot-solids test unit, and a valve slurry-test unit.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-010521/NAB, price code: A04. For information not in the report, contact: William Ayers, Morgantown Energy Technology Center, P.O. Box 880, Morgantown, WV 26505; (304) 291-4125.

0667 Locking Bolt: A locking ball in the bolt head holds the wrench in place

National Aeronautics and Space Administration,
Washington, DC.
Sep 84 *(F)*

The head of a proposed bolt would contain a locking ball and a release pin to grasp a box wrench or other tool. The locking bolt could be installed in cramped spaces that would prevent an operator from using both hands or where the operator's maneuverability is restricted by bulky clothing or obstacles. The new bolt could be made in two variations: either with a spring-loaded locking ball to restrain the wrench if the operator momentarily releases it or with a locking ball and release pin to lock the wrench on the bolthead. A similar design can be applied to other handtools.

FOR ADDITIONAL INFORMATION: For inquiries concerning licensing, contact Marvin F. Matthews, Lyndon B. Johnson Space Center, Mail Code: AL-3, Houston, TX 77058; (713) 483-4871. Refer to MSC-20439/TN.

Low Temperature Concrete Mortar Properties Are Detailed
See 0509

0668 Low-Contamination Vibrating Feeder for Silicon Chips: Making the trough top surface out of semiconductor-grade silicon would reduce contamination

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(F, G)*

Vibratory feeding is a method of controlling the flow of small oddly shaped particles. It is proposed that the top surface of the vibrating trough of a hopper for silicon chips be made of semiconductor-grade silicon. Although the trough will suffer some erosion from impact with the silicon chips, it will only introduce silicon (rather than a foreign material) into the feed. The technique could be applied to other materials that require contamination control by feeding the material through vibrating troughs topped by that particular material.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15128/TN.

0669 Low-Cost Alternatives In Hybrid Microcircuit Packaging: Adhesive sealing, nickel plating, and multiwire boards are evaluated

National Aeronautics and Space Administration,
Washington, DC.
Sep 84 *(B, G)*

Ways of reducing the cost of packaging hybrid microcircuits were evaluated. Based on a study involving fully developed hardware, adhesive packaging is considered instead of seam welding, nickel-plated Kovar (a commercial Fe/Ni/Co alloy) packages instead of gold-plated ones, and multiwire circuit boards instead of multilayer boards as alternatives for reducing the cost of hardware without reducing reliability. The major conclusions are that nickel plating and multiwire boards are recommended. Adhesive sealing is not recommended. The study included developing the techniques for sealing the packages with adhesive and for removing the lids after sealing; fabricating, assembling, and testing the hybrid circuits; designing a multiwire board functionally equivalent to the original multilayer board; and assembling and testing multiwire board assemblies.

FOR ADDITIONAL INFORMATION: Inquiries concerning rights for the commercial use of the technology described in the report should be addressed to Leon D. Wofford, George C. Marshall Space Flight Center, Mail Code: CC01, Marshall Space Flight Center, AL 35812; (205) 453-0020. For other information, contact Technology Transfer Division, P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to MFS-25809/TN.

Low-Temperature Plenum System Used for Firefighting Training Smoke Generators
See 0077

Low-Temperature Solar-Energy Systems: High efficiency is possible for industrial applications
See 0353

0670 Machining Dovetails Efficiently: A cross-axial milling technique is fast and precise

Army Materiel Development and Readiness Command,
Alexandria, VA.
Jun 84 *(F, G)*

A report describes a development effort aimed at minimizing the possibility of machining error and effecting substantial cost savings in the machining of dovetailed metal parts. As a result of this effort, which was conducted by the U.S. Army Armament Research and Development Command, a specification was prepared for the purchase of capital equipment that will permit rough and finish machining of dovetails. The specified machine will replace no fewer than five milling machines and will reduce the machining time standard of 33.41 hours per piece by approximately 28 hours to an anticipated standard of approximately 5 hours. The machine is based on a relatively new procedure using two cross-axial milling heads.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A126027, price code: A02, or contact project officer Gary E. Conlon (518) 266-5611.

0671 Machining Three Prongs on a Shaft: A simple tool reduces set-up and machining time

National Aeronautics and Space Administration,
Washington, DC.
May 84 *(F, G)*

A slightly unorthodox tooling arrangement is used to machine three prongs on the end of a special-purpose wrench. The arrangement reduces the setup and machining time by more than 70 percent below that required to perform the same task on a milling machine using conventional methods.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB83-925605, price code: E02.

Magnetic Flowmeter for Electrically Conductive Fluids: Improved accuracy is provided with minimum recalibration requirements
See 0510

Magnetic Wire-Rope Tester: Rope interiors can be inspected nondestructively
See 0511

0672 Magnetic-Wheel Refrigerator: Magnetocaloric machine offers high efficiency and a wide range of cooling temperatures
Department of Energy, Washington, DC.
Jun 84 *(J)*

A magnetic-wheel refrigerator has been proposed which operates at high efficiency over temperature-reduction ranges from 2 to 300K. In contrast, previous magnetic refrigerators have been limited to a temperature span of about 80K, and conventional gas-cycle refrigerators have operated at only about 10 percent efficiency. The new refrigerator may provide an economical way of liquefying hydrogen for use as a fuel. The magnetic wheel should provide a wide range of temperature reductions because it is composed of layers of magnetocaloric materials selected for their Curie temperatures to cool flowing gas in steps over the requisite range. The magnetic wheel should be efficient because it does not use the compressors and expanders of conventional refrigerators.

FOR ADDITIONAL INFORMATION: The patent documents on which this technical note is based are U.S. Patent 4,332,135, which is available from: Commissioner of Patents, Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

Magnetohydrodynamic Analogy Instrument Tests Supersonic Flows
See 0512

0673 Material Handling Systems for Large Tubes: Handling time can be cut in half
Army Materiel Development and Readiness Command, Alexandria, VA.
Oct 84 *(G)*

Several alternatives have been proposed for improving the productivity of facilities that manufacture large gun tubes. A study, sponsored by the U.S. Army Armament Research and Development Command, considered tubes with dimensions on the order of 12 in. in diameter and 20 ft long and weighing up to 4 tons. The proposed measures can be adopted by other facilities that produce large, heavy items -- steel beams and pipes, for example. The principal areas addressed by the study involve the transfer and positioning of the tubes within each shop bay, transfers between different bays, and transfers between buildings and storage areas. In processes where as many as 73 manufacturing steps are involved and overhead cranes are used to move the tubes, it has been estimated that between 10 and 15 percent of the total manufacturing time is spent for such transfers. Three alternatives were proposed that can substantially reduce this amount of time.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A128973/NAA, price code: A03, or contact project officer Robert J. Meinhart (201) 328-2295.

0674 Materials Laboratory Demonstrates Automated Sheet Metal Blanking Cell
Department of the Air Force, Washington, DC.
Sep 84 *(G)*

The Aeronautical Systems Division at Wright-Patterson Air Force Base has demonstrated an innovative, automated sheet metal blanking cell which is expected to reduce labor costs by as much as 60 percent over conventional manufacturing methods. Designed, developed and implemented onto the factory floor under an ASD Materials Laboratory program, the computer-controlled manufacturing cell will be used to produce accurate finished parts or sheet metal blanks (cut, flat sheet metal) for subsequent bending or forming. The cell requires only a single operator who works with the computer control system for instruction and data feedback.

FOR ADDITIONAL INFORMATION: Contact: Jo Anne Rumple, Wright-Patterson AFB, Ohio, 45433; (513) 255-2725.

Measuring Accurately With Thermocouples: Guidance is provided for detecting errors
See 0514

Measuring Coating Thickness: A gage measures the coating thickness in holes
See 0515

Measuring Diffusion and Recombination in Polycrystalline Silicon: Light-beam-induced currents yield information about solar-cell material
See 0354

Measuring Locomotive Drawbar Pull: A coupler pin becomes an accurate and rugged force sensor
See 0517

Measuring Recessed Pins: A sleeve-and-rod-tool measures distances in blind locations
See 0519

Measuring Tension in Transistor Suspensions: Vibration analysis is nondestructive and noninvasive
See 0525

0675 Melt-Level Sensing in Silicon-Web Growth: The shift of a laser beam reflected from the melt surface is sensed by a position detector
National Aeronautics and Space Administration, Washington, DC.
Nov 84 *(G, K)*

A laser beam is reflected from a silicon-melt surface onto a position detector to monitor melt level during web growth. With this method, silicon-web production could be increased by synchronizing silicon melt replenishment with the web growth rate. The light beam is directed at an angle of about 45 deg onto the melt surface from which it is reflected through a lens onto a commercial solid-state position detector. The vertical movement of the melt level produces a shift of the light-beam position, which is sensed by the position detector. Sensing the level of a silicon melt with a laser beam has been used previously for continuous Czochralski growth of silicon ribbon.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15356/TN.

Modified Oscillograph for Impacting Composite Materials: A commercial instrument is modified to impart energy in a realistic manner
See 0531

0676 Molten Slag Would Boost Coal Conversion: A proposed reactor would increase the residence time of unconverted char
National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(C, D)*

A proposed single-stage coal gasifier uses a molten-slag bath to increase carbon conversion without increasing oxygen consumption. The slag would increase the effective residence time of unconverted char by providing an oxygen-transfer medium. The improved gasifier was conceived to eliminate the problems presented by unreacted coal or char. Currently, this char must be recycled or burned in a boiler. This may be difficult and costly when the reactor is incorporated in a coal-conversion facility.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15711/TN.

0677 Monitoring Welding With Acoustic Emissions: Technique is useful for in-process evaluation
Department of Energy, Washington, DC.
Jan 84 *(D, G, H, K)*

A report presents the results of a 30-month program to evaluate the in-process acoustic-emission monitoring of weld quality. In particular, the program was directed toward the narrow-gap hotwire gas tungsten-arc welding of heavy-section steel. The welding process was developed for the field fabrication of vessels for coal gasification. The report concludes that acoustic emission is an effective in-process tool for nondestructive evaluation. The quiet nature of the weld process allows acoustic-emission monitoring at very high sensitivity and therefore allows very small weld imperfections to be detected. Furthermore, significant flaws can be detected easily at considerably lower sensitivity.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-017162, price code: A04, or contact D. W. Prine, GARD, Inc., 7449 N. Natchez Ave., Niles, IL 60648.

Multipurpose X-Ray Residual-Stress Analyzer: System is portable for field inspections
See 0533

National Voluntary Laboratory Accreditation Program
See 0534

New Directory Of Accredited Laboratories
See 0536

New Method of Joining Optical Fibers Is Developed
See 0978

Oxidation-Resistant Columbium Nozzles: Investment casting and silicide coating are combined to yield strong heat-tolerant parts for gas turbines
See 0168

0678 Passive Magnetic Bearing: A torsion wire assists permanent-magnet elements in maintaining shaft centering
National Aeronautics and Space Administration,
Washington, DC.
Feb 84 *(B, F)*

A new magnetic bearing for limited-rotation devices requires no feedback-control system to sense and correct the shaft position. The weight and bulk of position-control electromagnets, electronics, and power supply are therefore eliminated. The configuration easily lends itself to the incorporation of an intergral torque motor, with only a modest increase in weight. Since no parts rub, no wear particles are generated and no lubricant is required. Thus, long life is assured, even in vacuum and other environments in which debris accumulation, lubricant evaporation, or cold welding impair bearing operation.

0679 Phase Modulation Varies Average Acoustic Torque: Rotation of acoustically levitated objects can be controlled
National Aeronautics and Space Administration,
Washington, DC.
Aug 84 *(G)*

An acoustic-levitation system employs rectangular-wave phase modulation of the acoustic drivers to control the time-averaged torque on a levitated object. The object can thereby be rotated to a specified orientation or accelerated to a desired speed of rotation, as required for containerless processing. The system is based upon the principle that two perpendicular sinusoidal acoustic plane waves of the same frequency produce a local circulating acoustic field.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15689/TN.

0680 Planning Transport and Manufacturing for Lowest Cost: A method originally developed for spacecraft path-planning is also applicable to transportation and manufacturing
National Aeronautics and Space Administration,
Washington, DC.
Jun 84 *(J)*

A new algorithm alleviates some of the mathematical difficulties of planning segmented trajectories for lowest cost. Although originally developed to plan spacecraft trajectories, the method has terrestrial applications as well. For example, with modifications, it can be used to minimize freight costs and energy costs, which often change in steps, and mass production costs, which depend on the number of machines used. The algorithm involves a modified Newtonian iterative method in which the periapse times, the closest approach distances, and the orientations of the approach hyperbolas serve as the independent variables.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15391/TN.

0681 Plastic Clamp Retains Clevis Pin: A plastic clamp requires no special installation or removal tools

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(F)*

A triangular plastic clamp replaces a metal retaining ring for clevis-type pivots. The groove that receives the new clamp does not have to be as precisely machined as that for the metal ring, so assembly and fabrication costs are reduced. The new clamp slips easily over the end of the pin. Once engaged in the groove, it holds the pin securely. Moreover, it can be installed and removed easily without special tools -- a screwdriver or putty knife is adequate for prying it out of the groove. The clamp can be used to retain bearings, rollers, pulleys, and other parts that rotate. Potential applications might include slowly and intermittently rotating parts in appliances.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB83-925610, price code E02. Inquiries concerning rights for the commercial use of this invention should be addressed to Leon D. Wofford, Jr., George C. Marshall Space Flight Center, Mail Code: CC01, Marshall Space Flight Center, AL 35812; (205) 453-0020. Refer to MFS-19747/TN.

0682 Plated Metal Powders for Electrode Pastes: Metal grains to be sintered are precoated with frit metal

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(H)*

Improved coated metal powders are used to make the ink-like electrode pastes for the printing and sintering electrode-fabrication process. The grains of the base metal (for example, copper) are coated with a low-melting-point metal -- for example, lead or tin -- by electroless deposition. The electroless process plates each grain over its entire surface without the need for electrical contact to each grain. Due to agitation during plating, there is no agglomeration of the powder. Since the grains are already coated with frit metal, no special effort is needed to protect them from oxidation or to assure the wetting of the grains by the frit metal during sintering.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to Paul F. McCaul, NASA Resident Office-JPL, Mail Code: 180-601, 4800 Oak Grove Drive, Pasadena, CA 91103; (213) 354-2700. Refer to NPO-15161/TN.

0683 Plating Process to Improve Use of Chromium Has Been Developed

Department of Commerce, Washington, DC.
Dec 84 *(G, H)*

At the request of the American Electroplater's Society, the National Bureau of Standards has developed a process, and applied for a patent, to electrodeposit binary nickel-chromium and cobalt-chromium alloys on plain low carbon steel or aluminum surfaces. It is estimated that up to 30 percent of imported chromium can be saved if low carbon steels are substituted for bulk stainless steels which contain a large percentage of chromium and nickel. Many of the desired performance properties of stainless steels are only required at the surface of the material. Alloy coatings of nickel with chromium show superior wear performance and corrosion resistance when compared with commonly used bulk 316 L stainless steel.

FOR ADDITIONAL INFORMATION: Contact: Dr. David S. Lashmore, B162 Polymers Building, National Bureau of Standards, Gaithersburg, MD 20899; (301) 921-2958. For licensing agreements, contact Office of Federal Patent Licensing, National Technical Information Service, Springfield, VA 22161; (703) 487-4733.

Polymer Bonding of Optical Fibers: Optical waveguides are coupled through their sides
See 0982

0684 Portable Icemaking System is Developed

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(C, D)*

Solar energy research to develop improved solar collectors has resulted in icemaking system technology suitable for recreational ice rink use. This research was conducted under the sponsorship of the NASA Marshall Space Flight Center as part of a Department of Energy program. A mat of flexible plastic tubing is used to distribute a heat absorbing chilled working fluid through the flooded area to be frozen. The tubing mats are unrolled to cover the area to be frozen and covered with water. An antifreeze working fluid refrigerated to zero degrees Fahrenheit is pumped through the tubing mat and draws heat from the water covering the mat causing it to freeze. The system is portable and can be set up in a wide variety of locations and configurations. The use of flexible tubing made of a synthetic rubber-like elastomer eliminates the need for a rigid metal pipe network. Use of this technology has been successful for both small and large, indoor and outdoor, and temporary and permanent ice rink applications.

FOR ADDITIONAL INFORMATION: Contact: TECTRA fact sheets, School of Business and Public Administration, California State University, Sacramento, CA 95819; (916) 454-6640. Refer to TECTRA-case-S05-22/TN.

Portable Pallet-Weighing Apparatus: Weighing is safer and more convenient
See 0546

0685 Portable Plating System: A 30-gallon system is transported on a mobile cart

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(G)*

A plating system mounted on a portable cart includes a 30-gallon electrolyte tank, a filter pump, heaters, replenishing anodes, plating rectifiers, and a tank rectifier to continuously remove contaminants. A dropout relay in line with the plating rectifiers and the filter pump prevents plating in case of accidental interruptions in the current flow. The previous plating system was not portable. In addition, heater control in that system presented safety hazards.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-19631/TN.

0686 Portable Roller Staking Tool: Staking tool is compact and portable

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(F)*

A new tool combines clamping and staking operations in a single unit. The tool clamps the workpiece (a bearing or bushing), alines it, and stakes one of the flat faces. The unit is compact and light in weight. It can accommodate numerous bearing or bushing sizes through changes in dowel pins and staking-roller heads. It can be used for most roller staking operations for which there is access to both faces of the workpiece.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20281/TN.

Portable X-Y Scanner: Lightweight device uses just one drive motor for surface scanning

See 0548

Preparing Solar Cells for Soldering: Solder paste and contact ribbon are dispensed in synchronism

See 0358

0687 Pressure Reducing Valve (PRV) To Measure Steam Quality

Department of the Navy, Washington, DC.
Aug 84 *(D, F)*

Facility engineers often need information about steam quality (the percentage of dry steam in a steam system). Conventional installations of steam calorimeters cost about $2,000 each. It was found that the pressure reducing valve can be used to measure steam quality in steam distribution lines and thus avoid the cost of installation of calorimeters where not needed. The PRV functions like a throttling calorimeter. The minimum quality that can be measured by the throttling process is a function of the upstream and downstream steam pressures.

FOR ADDITIONAL INFORMATION: Contact: D.M. Sneed, Naval Civil Engineering Lab., Port Hueneme, CA 93043.

0688 Probe Array for Testing Printed-Circuit Substrates: Spurious conduction paths are found by an array of miniature test probes

National Aeronautics and Space Administration,
Washington, DC.
Feb 84 *(B, K)*

An array of tiny probes tests complex printed-circuit boards prior to the mounting of microcircuit chips and other active and passive components. A complete testing cycle - the insertion and alinement of a board, performance of the entire computer-controlled test, printing of the results, and removal of the board - requires about a minute. Performed manually, the same tests sometimes require as much as 30 hours.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to John O. Tresansky, Goddard Space Flight Center, Mail Code: 204, Greenbelt, MD 20771; (301) 344-7351. In either case refer to GSC-12759/TN.

Process for Molding Nonreinforced (Neat) Resins: Void-free moldings are obtained for neat, condensation, thermosetting resins

See 0813

0689 Production Cost Estimating: Interactive model combines learning-curve techniques with adjusted-unit cost methods

Army Materiel Development and Readiness Command,
Alexandria, VA.
Sep 84 *(G)*

While the learning-curve theory states that the cost of producing the next item is less expensive because the worker learns better production methods, production rate adjustment factors (PRAF) assumes that the adjusted unit cost increases as production rates change. Either an increase or decrease in the production rate impairs the learning curve and precludes any estimating that could be based on it. The U.S. Army Aviation Research and Development Command has developed an investment cost model that incorporates learning-curve theory and PRAF so the adjusted-average lot costs can be quickly estimated.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-P001236/NAA, price code: A02, or contact project officer Arnold V. Arconati (314) 263-1179.

Pull Test Verifies Gap Loading: The force necessary to initiate movement of a thin plastic strip is a measure of the gap tightness

See 0552

0690 Pumps as Turbines: Low cost and immediate availability are the prime advantages of pumps operated as turbines

Department of Energy, Washington, DC.
Jan 84 *(C, D, F)*

A report presents the results of a survey of owners, operators, consultants, engineering firms, and manufacturers on the use of pumps operating in reverse as turbines. The report discusses the types of pumps used, the methods of estimating their performance, modifications required, results of field tests, economics, operation and maintenance, control techniques, and sources of hardware and engineering assistance. The report finds that pumps are being successfully used as turbines, and the number of plants using them is growing rapidly.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-001143, price code: A01. For program-related information not in the report, contact Michael McLatchy, U.S. Department of Energy, Idaho Operations Office, 550 Second Street, Idaho Falls, ID 83401; (208) 526-0086.

0691 Purely Fluidic Servomechanisms: Fluidic integrated components are a feasible alternative

Army Materiel Development and Readiness Command,
Alexandria, VA.
Jul 84 *(D)*

Purely fluidic control systems are a practical alternative to electrohydraulic servosystems. Major advantages of fluidic components over their electrohydraulic counterparts include higher reliability, insensitivity to extreme environments, relatively low cost, and the potential for weight and size reduction. The conclusions were derived from a study of a closed-loop position control system made entirely from fluidic components. In static and dynamic tests conducted on the servosystem, the performance of the fluidic controller was shown to be comparable to an electrohydraulic servoloop. The results have demonstrated that standard fluidic components can be used in closed-loop servocontrol systems and perform as well as high-performance electrohydraulic commercial components.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A127362/NAA, price code: A05.

0692 Quality-Planning-Requirements Document: Report describes orderly methods for planning quality-assurance inspection procedures

National Aeronautics and Space Administration,
Washington, DC.
Aug 84 *(G, K)*

A new report outlines planning procedures that were used in establishing the inspection and quality-assurance activities required of contractors constructing and testing the Space Shuttle and its ground-support equipment. Since many of the planning procedures are described generically, the report should also be useful to contractors, subcontractors, and customers for establishing mutually-agreeable inspection points, whether in aerospace production or in commercial manufacturing operations.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20280/TN.

0693 Quenching Alloys in Containerless Processing: Gas quenching would be combined with magnetic levitation

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(G, H)*

Magnetic levitation and gas quenching are combined in a proposed method to melt and rapidly solidify alloys without contacting the container walls. This containerless-processing method would reduce contamination during the production of high-purity alloys and could, because of rapid cooling, produce alloys with fine-grain structure and possibly glassy structures. This method could be used to develop new carbides for drill bits, high-strength high-ductility structured steels, and new high-strength superplastic alloys.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to Leon D. Wofford, Jr., George C. Marshall Space Flight Center, Mail Code: CC01, Marshall Space Flight Center, AL 35812; (205) 453-0020. Refer to MFS-25305/TN.

Rapid Solidification Processing Research Atomizer Constructed

See 0555

0694 Reducing Drill Bit Wear Through Electrochemistry: A small source of electrical power downhole makes bits last longer

Department of Energy, Washington, DC.
Oct 84 *(D, F)*

An important wear mechanism for bits drilling through water-laden rock is electrochemical in nature: The synergistic effects of electrochemical corrosion and abrasion are responsible for a large portion of bit wear. However, wear rates can be reduced by a factor of 2 to 5 by applying a potential that exceeds the galvanic potential generated by downhole-corrosion cells. The possibilities of applying this technique in the downhole environment was studied. A downhole 'sub,' for example, powered by drilling fluid is a potential electric-power source. The electric power required for the desired effect for a drill bit 4 1/2 in. in diameter is about 1 mW.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-007373/NAB, price code: A03. For information not in the report, contact David A. Glowka, Sandia National Laboratories, Division 6241, Albuquerque, NM 87185; (505) 844-3101.

Reducing the Resistance of Conductive-Adhesive Bonds: Current pulses lower the resistance of silver-filled epoxies

See 0286

Reference Material Helps Manufacturers Evaluate Performance of Key Measuring Devices

See 0556

0695 Reinforcement for Stretch Formed Sheet Metal: Metal reinforcement is flame-sprayed on the edges gripped in the stretch-forming setup

National Aeronautics and Space Administration,
Washington, DC.
Feb 84 *(G, H)*

The tearing of aluminum sheet metal during stretch forming is prevented by flame spraying a layer of aluminum on the edges held in the stretch-forming machine. The technique improves the grip of the machine on the metal, and the reinforced sheet is better able to withstand the concentration of force in the vicinity of the grips. The flame-spray reinforcement technique should be applicable to other metals besides aluminum. It should be particularly helpful in custom, limited-run applications..

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20228/TN. Licensing information is available from Marvin F. Matthews, Lyndon B. Johnson Space Center, Mail Code: AL-3, Houston, TX 77058; (713) 483-4871.

0696 Reliability Model for Planetary Gear Trains: A probabilistic model provides a realistic estimate of life expectancy

Army Materiel Development and Readiness Command,
Alexandria, VA.
Jun 84 *(F)*

A report presents a mathematical model for reliability of planetary gear trains. Assumptions are that the input is via the sun gear, the ring gear is fixed, and the output is via the planet gear. The input and output shafts are coaxial, as are the input and output torques. This type of gear train is commonly used in main rotor transmissions for helicopters and in other applications that require high reductions in speed. The model was developed for the U.S. Army Aviation Research and Development Command.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by order-

ing the NTIS report, order number: AD-A119165, price code: A02, or contact project officer John J. Coy (314) 263-1625.

0697 Remote Manipulator Has Realistic Feel: The operator feels the load but not the manipulator inertia or friction

National Aeronautics and Space Administration,
Washington, DC.
May 84 *(A, B, G)*

A new computer-aided remote manipulator does not transmit the weight and inertia of its own joints and segments. Instead, the operator feels only the load, an important advantage over conventional manipulators when carrying out delicate tasks. The new system achieves its unique load sensitivity by processing the signals that move the manipulator (in response to the operator's movements of the hand controller) separately from those that apply reflective forces and torques on the hand controller. These reflective forces and torques are images of those felt by sensors mounted directly on the manipulator arm. Thus, they give the operator a true feel of the work the manipulator is doing.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15065/TN.

0698 Remotely-Adjustable Pressure-Control Valve: The simple, low-cost design resists leakage and clogging

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(F)*

A hydraulic valve, designed for controlling a high-pressure fluid stream with a low-pressure gas or fluid, includes a free-floating cylindrical control piston. The piston consists of a large-diameter cylinder joined to a cylinder of smaller diameter. The diameter of the larger cylinder is exactly double that of the gas pipe. With a gas blast against the larger cylinder, it is possible to regulate a high-pressure stream of up to 4,000 psi with a low-pressure gas of 500 to 1,000 psi. Small adjustments of the control pressure can be made remotely. The valve body and piston are easily machined.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15693/TN.

0699 Repairing Defective Welds: Welds are reinforced by electrodeposition

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(G)*

Welds that cannot be reworked because of their limited accessibility or material-annealing considerations can be reinforced by electrodeposition. The procedure may be of interest for nuclear reactor construction. A plastic container is placed around the weld area to be repaired and filled with an electrolytic metallic solution. An electrode fitted in the container directs the ionized metal to the area to be plated. The type of plating solution used depends on the parent metal and the structural requirements of the joint.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for the commercial use of this invention should be addressed to Leon D. Wofford, Jr., George C. Marshall Space Flight Center, Mail Code: CC01, Marshall Space Flight Center, AL 35812; (205) 453-0020. Refer to MFS-19618/TN.

Reproducible Mirror-Finish Metal Surfaces: Method produces highly reflective metal surfaces
See 0985

0700 Requesting and Preparing Proposals: Samples provide guidance on form and content

Army Materiel Development and Readiness Command,
Alexandria, VA.
Jun 84 *(F, G)*

Volume IV of the Flexible Manufacturing System Handbook, prepared for the U.S. Army Tank-Automotive Command, provides supplementary information designed to aid in deciding whether a flexible manufacturing system (FMS) is appropriate for a given application. The volume contains a sample request for proposal, a sample proposal, a glossary of FMS terms, a bibliography, and background material on machine-tool accuracy. The sample proposal contains detailed information and a price quotation for a six-machine FMS to produce prismatic parts.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A127930, price code: A06, or contact project officer David Pyrce (313) 574-6722.

0701 Retaining Ring Fastener for Solar Panels: A collapsible linkage enables rapid installation and removal of panels

National Aeronautics and Space Administration,
Washington, DC.
Jan 84 *(C, F)*

A simple articulating linkage secures solar panels into a supporting framework. The five-element linkage collapses into a W-shape for easy placement into the framework, then expands to form a rectangle of the same dimensions as those of the panel. The result is a large retaining ring around the outer edges of the panel. Removal of the linkage is simply the reverse of installation. The new quick fastener simplifies the removal and replacement of panels during maintenance. The fastener could also be used on removable wall panels, photographs, and signs.

FOR ADDITIONAL INFORMATION: Inquiries concerning rights for the commercial use of this invention should be addressed to Paul F. McCaul, NASA Resident Office-JPL, Mail Code: 180-601, 4800 Oak Grove Drive, Pasadena, CA 91103; (213) 354-2700. Refer to NPO-15369.

0702 Retaining-Ring Installation Tool: Simple piston device speeds up assembly

National Aeronautics and Space Administration,
Washington, DC.
Apr 84 *(F)*

A tool installs spiral-wound retaining rings quickly, reliably, and safely. The tool inserts rings in splined or irregularly shaped bores, bores at the bottom of deep holes, and other limited-access installations. The tool consists of a piston in a tube. A user inserts a retaining ring into the tube through a slot and places the tube over the bore into which the ring is to be inserted. The user pushes the piston handle, which squares the ring in the bore and pushes it along the bore until it engages the ring groove in the bore.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB83-925604, price code E02.

0703 Retractable Rotating Door Latch: After release, the latch withdraws out of sight
National Aeronautics and Space Administration,
Washington, DC.
Aug 84 *(F)*

A new mechanism turns a door latch, latching or unlatching the door, and then retracts until the latch is flush with the surface of the door frame. Concentric cylinders have cam grooves machined in their surfaces. When rotated relative to each other, the cylinders impart rotation and translation to the shaft of the door latch. The motions may proceed separately or simultaneously.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Division, P.O. Box 8757, BWI Airport, MD 21240. This invention is owned by NASA, and a patent application has been filed. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to Mervin F. Matthews, Lyndon B. Johnson Space Center, Mail Code: AL-3, Houston, TX 77058; (713) 483-4871. In either case refer to MSC-20304/TN.

0704 Reusable High-Pressure Connector: Connector for tests at 9,000 psi requires only minimal modification to the free end of the fluid line
National Aeronautics and Space Administration,
Washington, DC.
Apr 84 *(F)*

A fluid-line connector for high-pressure tests has a split ferrule, a nut, and an O-ring fitting are removed, leaving the line unaltered except for a bushing brazed to its free end. Previously, a tapered polytetrafluoroethylene ring was used for fluid-line tests on the Space Shuttle orbiter. However, the seal frequently deformed at the 9,000-psi test pressure, causing a sudden pressure loss and occasional 'blowoff' of fittings. In the new design, only the male part of the joint is brazed to the fluid line. The brazed bushing serves as a base for the split ferrule.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20339/TN. This Technology is available for licensing.

0705 Reworking Packaged Hybrid Microelectronic Circuits: Equipment and processes have been developed for fast and economical delidding and resealing
Army Materiel Development and Readiness Command,
Alexandria, VA.
Jul 84 *(B, G)*

A report presents results of a study of delidding and resealing hybrid microelectronic packages. This rework method involves removing the lid from a sealed package, repairing the circuit, and resealing the same package with a new lid. The method offers a tremendous potential for savings in the labor and material costs of manufacturing hybrid microelectronic packages, without incurring degradation of the microcircuit. Delidding and resealing also allow faster rework, reducing the impact of rework on regular production, and helping to meet production schedules. It is thus of interest to both manufacturers and users.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A115776/NAA, price code: A05, or contact project officer Bobby Austin (205) 876-2147.

0706 Robotic Off-Line Programming Applications Is Demonstrated
Department of the Air Force, Washington, DC.
Dec 84 *(A, F, G)*

An Air Force robotic language which allows off-line programming for aerospace manufacturing has been demonstrated. The advanced Machine Control Language used enables drilling and routing of aluminum parts without the use of a teach pendant. Developed for the Aeronautical Systems Division's Materials Laboratory's Integrated Computer Aided Manufacturing (ICAM) program by Grumman Aerospace Corporation, the robotic system is expected to greatly reduce production cost of weapon systems. To be implemented, the system is composed of four work cells and an ASEA robotic arm on a 20-foot track. The robot travels from cell to cell to perform its drilling and routing work. Thus, the robotic arm stays in almost constant use, as long as all four cells are loaded. The system is programmed offline using the revised Machine Control Language (MCL).

FOR ADDITIONAL INFORMATION: Contact: Jo Anne Rumple, United States Air Force, Aeronautical Systems Division, ASD/PA, Wright-Patterson AFB, Ohio 45433; (513) 255-2725. Refer to PAM 84-101/TN.

0707 Robotic Water-Blast Cleaner: Automated system will be fast, safe, and efficient
National Aeronautics and Space Administration,
Washington, DC.
Feb 84 *(D, G)*

A water-blasting system under development will remove hard, dense, extraneous material from surfaces. A high-pressure pump (up to 20,000-lb/sq in) forces water at supersonic speed through a nozzle manipulated by a robot. The impact of the water blasts away unwanted material from the workpiece, which is rotated on an air-bearing turntable. Designed for removing thermal-protection material from the Space Shuttle during post-flight refurbishment, the system is adaptable to such industrial processes as cleaning iron or steel castings.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25519/TN. For inquiries on licensing opportunities contact: Leon D. Wofford, Jr., George C. Marshall Space Flight Center, Mail Code: CC01, Marshall Space Flight Center, AL 35812; (205) 453-0020.

0708 Seawater Hydraulic Motor Under Development
Department of the Navy, Washington, DC.
Dec 84 *(B, C, D, F)*

Major modifications to its seawater hydraulic motor have enabled the Naval Civil Engineering Laboratory (NCEL), Port Hueneme, Calif., to achieve a technological milestone: a running time of more than 200 hours under 70- to 100-percent rated load conditions. It has taken the Laboratory more than four years since the prototype was developed and tested to reach this planned breakthrough in motor endurance. Removing the motor from the experimental stage by proving a reliability more than adequate for diver use represents a major technology advancement. The hydraulic motor uses seawater instead of oil as the working fluid, measures only 3 X 3 X 2 1/2 inches, and weighs five pounds. The reversible motor is a double-entry, balanced vane motor with relatively simple shapes, few parts, and is easy to maintain. The technology can be adapted to such diverse military and commercial areas as propulsion systems on submersibles, conveyor systems, shipboard machinery, submarines, and mining equipment and machinery..

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, VA 22448. Refer to 090902/TN.

0709 Self-Alining Quick-Connect Joint: Tapered joint is compact and lightweight

National Aeronautics and Space Administration,
Washington, DC.
Mar 84 *(F)*

A quick-connect tapered joint is used with a minimum of manipulation and force. Originally developed to assemble large space structures, the joint is simple, compact, strong, lightweight, self-alining, and has no loose parts. The joint consists of matching male and female thin-walled metallic or molded plastic cones, split metallic locking rings of graduated sizes, and several metallic split-ring retainers. Split locking rings in concentric grooves in the outside surface of the male cone mate with concentric grooves in the inside surface of the female cone to provide a positive lock.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB83-925603, price code E02.

0710 Self-Locating Latch: A latch locates fittings without using electronic sensors

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(F)*

A new latch secures a fitting without displacing the fitting and without regard to where on the latch the fitting makes its initial contact. The new latch is driven by a motor through a differential. When one of the moving jaws encounters the fitting, the differential senses the resistance and transfers power to the other jaw. After both jaws close, the motor is shut off to secure the fitting. The latch is purely mechanical, and requires no electronic sensors.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning license for its commercial development should be addressed to Leon D. Wofford, Jr., George C. Marshall Space Flight Center, Mail Code: CC01, Marshall Space Flight Center, AL 35812; (205) 453-0020. In either case refer to MFS-25956/TN.

0711 Self-Locking Connector: Mechanism is spring-loaded into a normally locked position

National Aeronautics and Space Administration,
Washington, DC.
Mar 84 *(F)*

A connector lock resists vibration, automatically compensates for wear, and exhibits no backlash when the parts are seated. The mechanism is built into the coupling nut on the outer connector body. An outer collar is turned clockwise to tighten the threaded coupling nut, transmitting torque to the coupling nut through six radially oriented pins. Vibrations will not loosen the connector even if the installer fails to tighten the nut.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for the commercial use of this invention should be addressed to Leon D. Wofford, Jr., George C. Marshall Space Flight Center, Mail Code: CC01, Marshall Space Flight Center, AL 35812; (205) 453-0020. In either case refer to MFS-19716/TN.

Self-Modulated Laser Rangefinder: Longitudinal resonance modes are exploited

See 0560

0712 Shape-Memory Couplings for Emergency Repairs: Damaged hydraulic lines can be repaired to nearly new condition

Army Materiel Development and Readiness Command,
Alexandria, VA.
Sep 84 *(F, H)*

Shape memory occurs when deformed metal alloys return to their original shape when they are heated above a characteristic transition temperature. In a study sponsored by the U.S. Army Aviation Research and Development Command, several hydraulic-tube repair couplings made of a shape-memory alloy have been designed and tested for helicopters. Such couplings are attractive not only for the speed and simplicity of installation, but also for their high strength, making them suitable for the repair of high-pressure hydraulic lines and vehicular drive shafts.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A127826/NAA, price code: A03.

0713 Shock Mounting for Heavy Machines: Elastomeric bearings eliminate extraneous forces

National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(F)*

A shock mounting originally developed for rocket engines under test might be used as a support for heavy machines, bridges, or towers. The new mounting replaces older supports used for Space Shuttle engine tests, which were carved out of 5,000-lb blocks of high-alloy steel. The old design was more expensive, and sometimes failed during engine proof testing. In a static test fixture for measuring the thrust of a rocket motor, the motor is supported by two flexure elements -- one forward and one aft. The forward support isolates the thrust from extraneous forces and impresses the thrust on load cells, which measure its magnitude.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB84-925612, price code E02.

0714 Small Diameter Pumps for In Situ Leaching

Department of the Interior, Washington, DC.
May 84 *(D, F)*

A study was conducted to reduce well construction and operation costs associated with in situ leach mining while increasing mineral recovery. After the borehole is cased, the new small-diameter (3 inches) jet pump, along with piping and accessories, is installed and connected to a centrifugal pumping unit on the surface. Two of the production and monitor jet-type pump injector systems were constructed and tested.

FOR ADDITIONAL INFORMATION: Contact: Dr. George A. Savanick, Bureau of Mines, Twin Cities Research Center, 5629 Minnehaha Avenue South, Minneapolis, MN 55417; (612) 725-4543.

0715 Solar Energy for Industrial Processes: Thermal systems could provide heat-delivery rates of 2.8 to 3.4 GJ/yr/sq m at a cost of $50/GJ/yr

Department of Energy, Washington, DC.

May 84 *(C, G)*

A design handbook and an overview of applications are available for solar industrial-process-heat (IPH) systems. Various solar thermal systems, which can provide heat in this temperature range, are commercially available now. The widespread use of these systems could substantially reduce the industrial demand for fossil fuels. The three main areas of application for this technology are: process hot water, drying/dehydration, and process steam. The contents of the design handbook are arranged to guide the user through a system design.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-021360, price code: A03. For information not provided in the report, contact B. Gupta, Solar Energy Research Institute, 1617 Cole Boulevard, Golden, CO 80401; (303) 231-1760.

0716 Solar Rotary Kiln: Unit decomposes zinc sulfate and other low-absorptivity materials efficiently

Department of Energy, Washington, DC.

May 84 *(C, F, G)*

A kiln uses solar energy to decompose substances having low absorptivity. The kiln is intended for use in thermochemical decomposition of zinc sulfate in a subcycle for producing hydrogen fuel. Zinc sulfate is introduced in the kiln through a feed tube. The kiln rotates continuously, agitating the sulfate particles that are repeatedly exposed to a solar beam entering a window at the lower end of the kiln. The rate at which sulfate moves through the unit is determined by the rate at which material is added, by the speed of kiln rotation, and by the tilt angle.

FOR ADDITIONAL INFORMATION: For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For further information, contact Pamela K. Shell, Lawrence Livermore National Laboratory, P.O. Box 808, L-338, Livermore, CA 94550; (415) 422-8006.

Solid-State Ballasts for Fluorescent Lamps: Major savings in lighting energy can be realized

See 0289

0717 Solutions of Transonic Flow in Turbomachines: Accurate approximations are obtained using perturbation techniques

National Aeronautics and Space Administration,
Washington, DC.

Sep 84 *(D, F)*

Perturbation procedures and associated computational codes were developed for determining nonlinear flow solutions of transonic flows in turbomachines. The perturbation procedures determine highly accurate approximations to families of nonlinear solutions that are either continuous or discontinuous and that represent variations in some arbitrary parameter. The computer program is configured to predict and plot an arbitrary flow variable (e.g., pressure coefficient) on the surface of a blade or airfoil and can account for the motion of: (a) one or more critical points (shock points), (b) a stagnation point, and (c) a maximum-suction-pressure point, or simultaneously for any combination of these. The program is written in FORTRAN IV for use on an IBM 3033 computer.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to LEW-13896/TN.

Spare Parts Inventory Control System Software

See 0221

0718 Spindle-Locking Mechanism: A cam-action lock has zero backlash

Department of Energy, Washington, DC.

Mar 84 *(F)*

A positive locking mechanism prevents the rotation of a machine-tool spindle, indexing head, or other rotating device at any of a number of preset angular positions. The mechanism is easily engaged and disengaged by hand and operates with little or no backlash. It can be used in the presence of such solid contaminants as dust or small machining chips that could interfere with other types of locking mechanisms.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-002365, price code: A02. For licensing information, contact: Office of Assistant General Counsel for Patents, US DOE, Washington, DC 20585.

0719 Spool-Valve Pressure-Difference Regulator: Valves maintain a preset pressure difference between gas flows

National Aeronautics and Space Administration,
Washington, DC.

Sep 84 *(F)*

A pair of valves maintains a constant pressure difference between two gas streams. Consisting of two connected spools that slide in multiport cylinders, the valves were originally developed to regulate the relative pressures of hydrogen and oxygen gases flowing to a fuel cell. The valves allow the gases to be supplied in the quantities required by the electric load while maintaining the proper proportions of the reactants. The simple spool valves replace custom-made regulator valves.

FOR ADDITIONAL INFORMATION: This invention is owned by NASA, and a patent application has been filed. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to Marvin F. Matthews, Lyndon B. Johnson Space Center, Mail Code: AL-3, Houston, TX 77058; (713) 483-4871. Refer to MSC-20127/TN.

0720 Staked-Bearing Removal Tool: A portable air-powered tool enables rapid bearing replacement with minimum effort

National Aeronautics and Space Administration,
Washington, DC.

Mar 84 *(F, G)*

An air-powered device cuts away retaining lips on one side of a bearing in preparation for removal of the bearing from an assembled structure. The tool makes it possible to replace the bearings without having to disassemble the structure. The device includes a shouldered post that is inserted into the bearing bore to position the tool and a set of Belleville springs and a nut to hold the tooling post tight against the bearing.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20337/TN.

Steel Grating Cage Provides Secure Enclosure
See 0158

Studies of the Inverted-Meniscus Deposition of Silicon on Ceramic: Controlled temperature profiles are essential to the production of solar cells
See 0836

Submillisecond Optical Knife-Edge Testing: Data are sampled much faster than the optical system drift rate
See 0565

0721 Surface-Moisture Monitoring Technique: Technique would monitor the drying of continuous sheets of thin material

National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(H, K)*

The effect of moisture on a heated metal ribbon is the basis for a moisture sensor tested at NASA's Jet Propulsion Laboratory. The new ribbon sensor measures the moisture in a solid material placed in contact with it. It therefore has possible applications in industrial production of sheet materials, such as paper and fabric. One form of the new sensor is a stainless-steel ribbon is mounted in a plastic roller, such that the ribbon is flush with the roller surface. Copper leads attached to the ends of the ribbon exit the roller along its axis. The ribbon is excited by a square-wave current pulse, which heats it and raises its resistance. Contact with a moist material transfers heat from the ribbon, thus lowering its temperature and decreasing its resistance. This difference in resistance, before and immediately after contact with the material, is a measure of the moisture content.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to Paul F. McCaul, NASA Resident Office-JPL, Mail Code: 180-601, 4800 Oak Grove Drive, Pasadena, CA 91103; (213) 354-2700. In either case refer to NPO-15494/TN.

0722 Tandem Production Operations: Two methods are developed for selecting the capacity of a buffer between two asynchronous production operations

Army Materiel Development and Readiness Command,
Alexandria, VA.
Sep 84 *(G)*

Because of the shortcomings in the present methods of examining the utilization of the buffer and the productivity of the manufacturing process, a methodology was developed for the U.S. Army Armament, Munitions and Chemical Command Systems and Operations Analysis Directorate. Two methods were developed -- GS.BUF and BUF.CAP -- and implemented in computer programs. Using the GS.BUF method, it was found that when a simple production system satisfies the assumption of exponentially-distributed service times, the results of GS.BUF are exact. With the stochastic steady state, the probability density function (pdf) of buffer occupancy is U-shaped.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A132639/NAA, price code: A05, or contact project officer George Schlenker (309) 794-5075.

0723 Task Board Tests Manipulator Performance: Robotics systems can be quantitatively evaluated

National Aeronautics and Space Administration,
Washington, DC.
Feb 84 *(D, F)*

A task board has been constructed to facilitate time-and-motion studies for remote manipulators. The apparatus is equipped with holes, objects of various shapes to be grasped, and sensors with switches to indicate contact. Some sensors detect the raising of a manipulator-held tool, others detect the touching of a contact point by the tool, and still others measure conformity to tolerance and movement distances. A spring-loaded plunger in a receptacle on the board measures tool penetration. The task board is expected to be useful in the evaluation of industrial robots programed to assemble parts.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15150/TN.

0724 Technology for Flexible Manufacturing: Key subsystems are described

Army Materiel Development and Readiness Command,
Alexandria, VA.
Jun 84 *(F, G)*

Volume II of the Flexible Manufacturing System Handbook, prepared for the U.S. Army Tank-Automotive Command Research Center, contains detailed descriptions of the subsystems that constitute a typical flexible manufacturing system (FMS). The volume, which also describes several operational FMS's, begins with a discussion of the principal physical characteristics of a system, including the central elements, the machining stations, the load/unload stations, the control station, and the cleaning stations. The materials-handling systems are considered next, followed by a detailed description of the control system. The many software functions are explored in depth. Finally, the important remaining elements of an FMS are addressed.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A127928, price code: A04, or contact project officer David Pyrce (313) 574-6722.

Test Pattern for IC's: Random-fault densities are measured in an array of standard structures
See 0570

0725 Testing Bearings in Tight Spaces: Tool turns a force around 90 deg to test bearings in cramped places

National Aeronautics and Space Administration,
Washington, DC.
Jun 84 *(F, K)*

A portable tool checks bushings and bearings in hard-to-reach places to ensure that they are properly staked. The tool applies a force around a right-angle bend -- a capability that can make it unnecessary to disassemble equipment to gain access to the parts. The tool is used with a hydraulic cylinder and a load-cell. The tool could be used to install or remove bearings, to press-fit parts, to remove nails, and to force sheet metal into position.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-

0100. Inquiries concerning rights for the commercial use of this invention should be addressed to Marvin F. Matthews, Lyndon B. Johnson Space Center, Mail Code: AL-3, Houston, TX 77058; (713) 483-4871. In either case refer to MSC-20250/TN.

Thermal Elastohydrodynamic Lubrication of Spur Gears: Program and analysis predict lubricant film thickness and the variations of dynamic load and temperature
See 0838

Thermographic Testing of Composite Materials: Techniques and equipment are reviewed
See 0574

Thickness Gaging of Vapor-Deposited Metal Films: Phase-sensitive eddy-current instrument and microprocessor determine thicknesses with (25-nm) precision
See 0575

0726 Three-Fingered Robot Hand: Mechanical joints and tendons resemble those of a human hand
National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(F, G)*

A robot hand under development will be able to perform rapid, small motions by humanlike finger actions -- independently of its manipulator arm. It will be attachable to many different manipulators without modifications to the arms. The hand even has potential as a prosthesis for humans. The hand employs three opposed fingers. Each has three joints and a cushioned tip on the outer segment. The new hand eliminates some problems with previous designs. Its motor drives are on the forearm (rather than on the hand itself), where their weight and inertia impose no loads on the hand actuators. The drives are more easily accommodated on the forearm and have a much smaller effect on its response than they would if located on the hand.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to Paul F. McCaul, NASA Resident Office-JPL, Mail Code: 180-601, 4800 Oak Grove Drive, Pasadena, CA 91103; (213) 354-2700. Refer to NPO-15959/TN.

0727 Three-Level Control of Manipulators: Hierarchical control yields fast response
National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(F)*

A concept for control of remote manipulators is based on a three-level hierarchy that allows complex tasks to be performed in real time. The scheme was developed for interactive human/computer control with sensory feedback. The hierarchical structure allows control data to be processed in parallel. It can thus quickly handle the immense amounts of data involved in sensory feedback (position of the end effector, its proximity to targets, and force and torque exerted by it).

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15048/TN.

0728 Tool Enlarges Hard-to-Reach Holes: Tool centers itself and cuts to a precise depth
National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(F)*

A cutting tool makes it possible to enlarge valve seats or other orifices in hard-to-reach locations. The tool consists of a crosscut carbide bur; a sleeve that serves as a depth stop and pilot; a length of flexible, strong piano wire; and a standard drive socket. The parts are brazed together. The piano wire transmits torque and axial force to the cutting tool. Before the cutting of an inaccessible orifice is started, the tool is used to machine a simulated orifice in a metal block. A mold is then made of the machined surfaces and is observed on a comparator. If the shape is correct, machining can proceed.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB84-925611, price code E02.

0729 Tool for Guiding an Auger: A threaded ram with the same pitch as the auger reduces potential damage to fragile workpieces
National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(F)*

Fragile materials, such as the surface-insulation tiles on the Space Shuttle orbiter, are easily damaged when drilled or bored. However, a tool designed to guide an auger, significantly reduces the possibility of such damage. A threaded ram that has the same pitch as the auger guides it at the rate at which it 'naturally' tries to move through the material. Since it does not overdrive the auger, the tool reduces the chances of breaking the workpiece. The principle of the tool could be applied to installing threaded studs in plastic or rubber, where it is impractical to mold them in.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB83-925610, price code E02.

0730 Tool for Replacing Bushings: The centerlines of the original bushings are maintained
National Aeronautics and Space Administration,
Washington, DC.
Aug 84 *(F)*

A tool originally developed to replace two adjacent wing bushings on the Space Shuttle could be redimensioned for bushing replacement in other applications as well. The tool performs the following tasks: picking up the centerline of the old bushings so that the new bushings can be installed on the same axis; forcing out the old bushings; redrilling and reaming the hole left by the old bushings; and forcing new bushings into place.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20282/TN.

0731 Tool for Taking Clay Impressions: Profiles of parts are transferred for measurement
National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(F)*

Clay impressions of small parts are taken with a tool consisting of a hollow tube closed at one end. Slots at the other end admit the part a short distance into the tube. The tube is filled with clay protruding beyond the slots. It is then pressed against the part so that the part slides into the bottom of the slot, displacing the clay as it goes. The displaced clay forces an equivalent amount of clay out through holes and other gaps, thereby relieving the pressure and preventing clay springback that would distort the impression. The clay impression could be used to make a silicone rubber mold for subsequent examination.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-19728/TN.

0732 Tool for Tightening Bolts With Knurled Heads: A modified clamp transfers a torque to the bolthead

National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(F)*

A readily-available spring-loaded clamp can be modified so that it can transfer a measured torque to a bolt with a knurled head. The modified clamp holds the bolthead in its jaw while torque is applied through it. Normally, the bolt is secured finger-tight and no tools are needed. The clamp is modified to apply additional pressure to secure the clamp to the bolthead and to hold the shortened shaft of a hexagonal socket head so that torque can be applied by a standard torque wrench. Plastic tips on the clamp protect the bolthead finish.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25694/TN.

0733 Tooling Converts Stock Bearings to Custom Bearings: Grinding process uses a special bearing holder

National Aeronautics and Space Administration,
Washington, DC.
Mar 84 *(F, G)*

A technique for reworking stock bearings saves time and produces helicopter-rotor bearings that are ground more precisely than new bearings purchased from the manufacturer. The grinding setup meets strict machining requirements, including: unobstructed upper surfaces of the bearing, 100-lb (440-N) preload on the inner race, and a tool block with surface flushness equal to or better than the table of the grinding machine. The main problem in grinding the stock bearing is devising a piece of hardware to put the 100-lb preload on the inner race and to grasp the bearing firmly without interfering with the grdining oepration.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrmas is available by ordering the monthly subscription package, order number PB83-925603, price code E02.

0734 Tooth-Profile Changes in Spiral-Bevel Gears: Mathematical analysis illuminates pressure angle relationships and other characteristics

Army Materiel Development and Readiness Command,
Alexandria, VA.
May 84 *(F)*

Research resulted in an analysis of tooth-profile changes, heel-to-toe, of circular-cut spiral-bevel crown gears. The changes are examined in the transverse plane of the gear. Spiral-bevel gears are used in high-performance transmissions because their curved teeth provide smoother and quieter operation than straight-bevel gear teeth. In addition, the curved teeth provide greater bending resistance. The analysis, which was performed in part by the U.S. Army Aviation Research and Development Command, assumes a straight-line profile in the midtransverse plane. The procedure used in the analysis for determining the cutter profile can be used for any desired tooth profile.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A119163, price code: A02 or contact project officer John J. Coy (314) 263-1625.

0735 Torque Compensator for Mirror Mountings: Device nulls flexural distributions of pivotal torques

National Aeronautics and Space Administration,
Washington, DC.
Aug 84 *(F)*

A magnetic torque-compensating device nulls the angular acceleration of a scanning mirror by opposing the torque generated in the mirror pivots. With the magnetic compensator, the net torque on the mirror is nearly zero, resulting in a scanning angular velocity that is nearly constant. The compensator assembly consists of two major components, each containing two magnets. The rotating magnet bar attaches to the back of the scanning mirror.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Division, P.O. Box 8757, BWI Airport, MD 21240. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to John O. Tresansky, Goddard Space Flight Center, Mail Code: 204, Greenbelt, MD 20771; (301) 344-7351. In either case refer to GSC-12742/TN.

0736 Torque-Wrench Extension Arm: Chain-link pulleys transmit torque to hard-to-reach fasteners

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(F)*

A torque-wrench extension arm makes it possible to apply a torque to a bolt, screw, or nut that is inaccessible to conventional wrenches or is in areas where a wrench cannot be manipulated. It could be used in narrow pockets and behind panels and walls. Torque is transmitted along a chain-link pulley attached to two sprockets, all contained within a long narrow hollow housing. A shaft attached to one sprocket receives the input torque from a conventional torque wrench. A periscope accessory could be added to simplify locating the inaccessible fastener components.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15495/TN.

Transporter for Treated Sheet Materials: Plastic spacers keep parts separated during transport or storage

See 1020

0737 Tube Recycling by Rotary Forging: Substantial cost savings are possible

Army Materiel Development and Readiness Command,
Alexandria, VA.
Jul 84 *(G)*

A program has been evaluated for recycling scrap gun tubes by rotary forging. The process, developed by the U.S. Army Armament Research and Development Command, involves no intermediate melting and produces new, smaller-sized tube forgings from the original scrap tubes. The recycling process consists of first machining the tubes to remove rough surface damage; then preheating, rotary forging, and heat treating the tubes to obtain the desired product. A computer program directs the operation by generating the optimum mix of new tubes that can be produced based on the dimensions of the old tubes.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A130921/NAA, price code: A03, or contact project officer Charles Calderone (518) 266-4179.

Turbin Blades Improved
See 0175

Two-Slit Optical Particle-Measuring System: Sizes and velocities are quickly estimated
See 0578

Ultrasonic Detection of Fatigue Cracks: Report notes progress in ultrasonic characterization of crack growth
See 0579

Ultrasonic Tube Tester: Probe provides complete scanning of tubular materials
See 0580

0738 Ultrasonics and Optics Would Control Shot Size: Uniformly-sized silicon shot would be produced by a proposed feedback system
National Aeronautics and Space Administration,
Washington, DC.
Feb 84 *(G, H)*

A proposed feedback system would assure the production of silicon shot of uniform size. The new control method is particularly advantageous in that constant size could be maintained even while other process variables are changed deliberately or inadvertently (for example, the increase in nozzle diameter with erosion). A piezoelectric ultrasonic transducer is placed on a nozzle to vibrate a silicon stream. The shot size is determined, in part, by the wavelength of vibrations in the liquid stream as it breaks up into drops. Thus, the vibration frequency can be varied to control the shot size. It is applicable to other materials as well.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15608/TN.

Universal Pin Electronics Tester: Improved performance and reliability are obtained at reduced cost
See 0582

0739 Variable-Conductance Heat-Transfer Module: Working lengths of heat pipes are electronically controlled
National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(D, F)*

Under electronic thermostatic control, a new variable-conductance heat-transfer apparatus maintains a process fluid at a steady temperature. Originally intended to provide thermal control for spaceborne material-processing systems, the system is expected to operate reliably for many years. The concept is adaptable to terrestrial instruments or processes in which atmospheres or fluids must be cooled and returned to the instruments or processes at fixed, lower temperatures.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive license for its commercial development should be addressed to John O. Tresansky, Goddard Space Flight Center, Mail Code: 204, Greenbelt, MD 20771; (301) 344-7351. Refer to GSC-12771/TN.

Vibration-Isolation Bench for Testing in Vacuum: Precise optical systems can be tested without contamination
See 0584

Walnut Hulls Clean Aluminum: Hulls inflict minimal substrate damage
See 0840

0740 Wicking Coating for Heat Pipes: Grooves in a porous coating are produced by flame-spraying over a wire mesh
National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(G)*

A 'wicking' for the inside of heat pipes and heat-storage canisters can be formed by flame-spraying a porous coating over a wire mesh placed on the surface to be treated. When the mesh is removed, the wicking remains, consisting of many small channels in the surface coating. The method should be less expensive than permanently spot-welding a wire mesh, the technique currently used. It also can be used on nonmetallic surfaces, whereas spot-welding cannot.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15212/TN.

0741 Wire Retrieves Broken Pin: A safety wire retains the pieces of a broken tool
National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(F)*

A solid pin that could not be redesigned to prevent breakage was instead redesigned to permit easy retrieval of the broken pieces. In the new version, the pin retains the same outside dimensions, but the inside is hollow so that a safety wire can be strung through it. A metal bead is brazed or welded onto the end of the wire at the tip of the pin. Should the pin break, the pieces are removed from the hole by pulling on the wire. Applying this idea to a solid pin used in a NASA liquid-oxygen system lowered costs by avoiding the delays previously associated with fishing out the pieces of the broken tool. The safety-wire concept is suitable for other pins that are subject to deflection or breakage.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing a detailed diagram is available by ordering the monthly subscription package, order number PB84-925611, price code E02.

Wire Tester: Detects breaks, changes in cross section, and embedded foreign material
See 0586

0742 Workshop on Robotics: Tutorial papers are compiled
Army Materiel Development and Readiness Command,
Alexandria, VA.
Sep 84 *(F, G)*

A document presents proceedings from a tutorial workshop on robotics and robotic control problems. The objectives of the workshop were to provide a general introduction to the subject, to outline the technical content of advanced robot control, and to provide a forum for discussion of R & D topics. The first session deals with robot mechanisms, sensors, and control. The second session is devoted to the mathematics and computer programing for robot control. The third session treats topics in the area of visual sensing for robot control. The workshop was hosted by Oakland University, Rochester, Michigan, on October 26, 1982. The document contains over 300 pages of text, illustrations, and tables.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A134852/NAA, price code: A15.

X-Ray Detector for 1 to 30 keV: Array of deep silicon cells can be used for imaging or spectroscopy
See 0588

X-Ray Inspection of Transistors: A component holder speeds examination of matched pairs
See 0590

X-Ray-Diffraction Residual-Stress Analysis: Nondestructive method allows measurement of surface stresses in metal and ceramic materials
See 0591

MATERIALS

Accelerated Curing of Epoxy Resins: Trisubstituted urea/epoxy mixture generates amine that lowers the curing temperature
See 0084

Accelerated Solar-UV Test Chamber: Medium-pressure mercury-vapor lamps provide a high ratio of ultraviolet to total power
See 0446

Accelerating Epoxy-Resin Curing: Trisubstituted ureas simplify the curing process and speed it up
See 0085

0743 Acoustic Design Improves Composite Impact Resistance: Composite acoustic response to impact should be included in design criteria
National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(H, J)*

Improved tolerance of composites to impact damage is achieved using an acoustic response model to characterize the dynamics of the damage mechanism. The model is based on the assumption that in addition to the classical mechanical properties, such as interlaminar strength, buckling strength, and tensile and shear moduli, the damage mechanism depends on the acoustic properties of the composite material. Therefore, impact-tolerant design of a composite structure can be developed by placing proper emphasis on the acoustic response of the material.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for the commercial use of this invention should be addressed to Howard J. Osborn, Langley Research Center, Mail Code: 279, Hampton, VA 23665; (804) 827-3725. In either case refer to LAR-12887/TN.

Acoustic-Emission Methods for Composite Materials: Techniques can be used for quality control and nondestructive evaluation
See 0448

0744 Acoustical-Levitation Chamber for Metallurgy: The sample can be moved to different positions for heating and quenching
National Aeronautics and Space Administration,
Washington, DC.
Apr 84 *(D, G)*

An acoustical-levitation chamber accommodates large temperature gradients and manipulates metallurgical samples or fusion pellets without permitting solid material to contact them. A sample can be moved back and forth between stable levitation positions for heating and quenching simply by changing the signals to the acoustic drivers.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15453/TN. This technology is available for licensing.

0745 Adhesive Removal From Protective Clothing: An electric eraser removes butyl cement from protective coveralls
National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(H)*

The protective coveralls worn by handlers of hypergolic propellants often become soiled with butyl cement. Usually this cement is removed using medical tongue depressors as scrapers--a long and tedious procedure. An efficient alternative is to use a conventional rotary electric eraser. The erasing tip is applied at about 3,600 rpm. The speed of the rotation varies with the pressure applied by the operator. Too much pressure simply stalls the eraser without damaging the fabric. The method can be used to remove other adhesives from different surfaces.

FOR ADDITIONAL INFORMATION: No further documentation is available.

0746 Analytical Methods for Glass-Fiber-Reinforced Composites: Techniques for quality control are reviewed
Army Materiel Development and Readiness Command,
Alexandria, VA.
Jul 84 *(H, J, K)*

The physical, chemical, and ultimate mechanical properties of high-performance glass-fiber-reinforced composites are dependent on the degree of cure and structure of the epoxy matrix. Several of the methods used to characterize and control the curing of epoxy matrices are provided in a state-of-the-art review, prepared for the U.S. Army Aviation Research and Development Command. The methods include such dynamic mechanical tests as torsional braid analysis and torsional impregnated-cloth analysis; calorimetric analyses, including differential scanning calorimetry and differential thermal analysis; and other physical methods, such as dielectric analysis. Also covered are several spectroscopic techniques ranging from Fourier-transform infrared spectroscopy to Raman spectroscopy.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by order-

ing the NTIS report, order number: AD-A131038/NAA, price code: A04, or contact project officer Joe Pratcher (314) 263-3079.

0747 Anisotropic Embrittlement in Hard ESR Steel Forgings: The short transverse direction loses ductility

Army Materiel Development and Readiness Command,
Alexandria, VA.
Jun 84 *(G, H)*

A report by the U.S. Army Materials and Mechanics Research Center presents results of a study of the mechanism of severe degradation of short transverse mechanical properties in forgings made of high-hardness electroslag-remelted (ESR) 4340 steel. The forgings, however, revealed a severe loss of ductility in the short transverse direction, and a number of helicopter components failed in service. The influence of tempering temperature on the short-transverse tensile properties was investigated for several heats of the steel. Isotropic properties are restored by a homogenization treatment.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A113906, price code: A02, or contact project officer Eric B. Kula (617) 923-5000.

Aromatic Polyimides With Group VI Linkages: Thermally-stable, solvent-resistant polyimides are readily processable by hot-melt techniques
See 0088

0748 Battery Grid for Submarines May Have Industrial Uses

Department of the Navy, Washington, DC.
Mar 84 *(C, H)*

Scientists at the Naval Surface Weapons Center have developed high-strength lead metal-matrix composites to replace current battery grid materials. The improved battery grid will have many industrial applications, such as being used in load leveling devices, traction batteries (the type used in forklifts and golf carts), and emergency lighting systems. Tests simulating battery conditions using prototype metal-matrix composite grids have demonstrated that batteries could last over 12 years and can even increase the power capacity. Metal-matrix materials such as Pb/FP and Pb/Mc make excellent grid materials since they exceed the presently used Pb/Ca alloy in mechanical strength.

FOR ADDITIONAL INFORMATION: Contact: Navy Technology Transfer Fact Sheet, Code E411, Naval Surface Weapons Center, Dahlgren, VA 22448. Refer to 080901.

0749 Better Seals for Vacuum Bags: A roller tool spreads an even layer of adhesive

National Aeronautics and Space Administration,
Washington, DC.
Aug 84 *(F, G, H)*

The simple expedient of smoothing out the adhesive along the periphery of a vacuum bag improves the chances for a successfully-cured composite layup. A tool that resembles a paint roller compresses the adhesive to an even layer prior to the application of a vacuum, reducing the chance of a leak developing after the bag is evacuated. Such a tool could be purchased or put together easily out of scrap parts. In a typical vacuum cure, the preimpregnated composite material ('prepreg') is laid up on a metal plate. A heat-resistant plastic film is placed over the layup and sealed to the plate by a layer of adhesive along the edge of the film. The bag is then evacuated, and the entire assembly is heated.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagram is available by ordering the monthly subscription package, order number PB83-925608, price code E02.

0750 Calculating Static-Seal Leakage Correlation: Operational leakage rates of various working fluids are predicted from test data

National Aeronautics and Space Administration,
Washington, DC.
Aug 84 *(D, J)*

An expression that converts the leakage rates of fluids at various pressures and temperatures to rates at other pressures and temperatures has been modified by a multiplying factor to include the effects of changing leak-path area. The method was developed to use a leakage measured at engine test conditions to predict the leakage at engine operating conditions for a pressure-assisted silver-plated elastomeric seal. Based on a modified expression for laminar flow between parallel plates, the method converts leakage through a fixed-area flow passage from one set of fluid conditions to another. This correlation method has many potential applications for extrapolating from test conditions to operating conditions. For example, this method was prepared for calculating gas leakage during the incident at the Three-Mile-Island nuclear reactor plants.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Division, P.O. Box 8757, BWI Airport, MD 21240. Refer to MFS-19674/TN.

Catalog of Standard Reference Materials
See 0454

Cathode Corrosion in Lithium/ulfuryl Chloride Batteries: Causes and cures of short shelf life are examined
See 0308

Ceramic Solar Receiver: Matrix concept offers efficient heat transfer at high temperatures
See 0309

Ceramic 1,500C Test Furnace: Unit is inexpensive, easy to construct, and requires little power to operate
See 0455

Ceramics for Solar Receivers: Materials for high-temperature use are reviewed
See 0310

0751 Characterization Methods for Composite Reliability: Chemical, physical and mechanical tests are described

Army Materiel Development and Readiness Command,
Alexandria, VA.
Jul 84 *(H, J, K)*

The methods currently available for characterizing the reliability of primary structures made of composite materials are covered in an overview prepared for the U.S. Army Aviation Research and Development Command. The work covers chemical quality assurance, processability testing, cure monitoring and management, nondestructive evaluation, and performance and proof testing. Several methods and analysis flow charts are provided for chemical assurance testing, which involves verifying the material constituents in composite prepregs. Assessments, including the advantages and limitations, are presented for each of the techniques. Similar assessments are provided for the processability tests used to determine how a composite material performs during a manufacturing cycle. A wide variety of nondestructive evaluation techniques are covered ranging from ultrasonic methods and neutron radiography to several bond tests. Also included are newly developed methods for evaluating the interface quality of laminated-composite structures such as ellipsometry, surface-potential difference, photoelectron emission, and surface-remission photometry.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A118410/NAA, price code: A04, or contact project officer R.J. Shuford (617) 923-5000.

0752 Characterization of Elastomer Vulcanizate Materials: Pyrolytic gas liquid-phase chromatography (PGC) identifies elastomers in sealing and connecting components of hydraulic system

Army Materiel Development and Readiness Command,
Alexandria, VA.
Nov 84 *(H, J, K)*

Some of the synthetic and natural polymers used in the construction of diaphragms, hoses, O-rings, and cups can contaminate the petroleum-based hydraulic fluid of the system. Although PGC has been a valuable analytical tool in identifying different elastomers by class, it has been difficult to reproduce the results in different laboratories. In a program carried out by the U.S. Army Mobility Equipment Research and Development Command, the cause of the disagreement was attributed to the diversity of the pyrolysis apparatus. The technique is extremely useful when a reference library of pyrograms is generated within the laboratory using identical pyrolysis and PGC operating conditions for standard and sample analyses.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A134056/NAA, price code: A02, or contact project officer Robert G. Jamison (703) 664-4325.

0753 Characterization Techniques for Composite Materials: State-of-the-art methods are presented

Army Materiel Development and Readiness Command,
Alexandria, VA.
Jan 84 *(H, K)*

Recent proceedings consisting of 35 articles cover four major areas on the characterization of composite materials. The proceedings, aimed at establishing methods for predicting composite performance, were prepared by the U.S. Army Materials and Mechanics Research Center. The first area pertains to techniques for monitoring the cure-cycle of fiber-reinforced epoxy resins for process-control. The second area deals with the effects of moisture on the mechanical properties of composite materials. The third area consists of numerous methods for characterizing composite structures and predicting structural performance. The fourth area is a collection of recent advances in composite-material science relevant to predicting mechanical properties.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A116733, price code: A22, or contact project officer Gary L. Hagnauer (617) 923-3434.

0754 Characterizing Epoxy Matrices for Composites: A variety of testing techniques used in combination yield information useful for quality control

Army Materiel Development and Readiness Command,
Alexandria, VA.
Aug 84 *(H, J, K)*

A research effort reviewed several methods for characterizing the epoxy matrix in glass-fiber-reinforced composites. The methods include spectroscopy, differential scanning calorimetry, dielectric analysis, and dynamic mechanical tests. The physical, chemical, and ultimate mechanical properties of high-performance composites are dependent on the degree of cure and structure of epoxy matrices. Therefore, a knowledge of the curing process and composition of epoxy matrices is essential for relating the properties of composites to the extent of the reaction and optimizing the performance.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A131038/NAA, price code: A05, or contact project officer Joe Pratcher (314) 263-3079.

0755 Characterizing Shear Properties of Membranes: Shear stiffness is determined for use in vibration analysis

National Aeronautics and Space Administration,
Washington, DC.
May 84 *(D, H, K)*

Values of shear stiffness for flexible sheet materials are needed for finite-element dynamic analysis of in-plane vibrations. It is often assumed that the static shear stiffness closely approximates the dynamic shear stiffness. A method has been devised to obtain static shear-stiffness data for membranes. The shear deflection of the membrane is measured under various applied static shear loads, and the measurements are plotted. A match is attempted between the experimental plot and predicted load-vs-deflection curves until the best-fitting theoretical curve is found. The stiffness of the membrane is then taken as that used to calculate the best-fitting theoretical curve.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB83-925805, price code E02.

Chromium Ion Implantation Can Prevent Corrosion in Steel Bearings Used in Navy Aircraft
See 0002

Coating for Carrier Decks Improved
See 0004

Compliant Coatings for Turbulent Drag Reduction Under Development
See 0939

0756 Conserving Energy in Scrap Iron and Steel Facilities: Energy costs can be reduced by 20 or more percent

Department of Energy, Washington, DC.
Mar 84 *(C, G)*

A handbook shows a number of ways to reduce energy costs in companies processing scrap iron and steel. The energy costs in these companies are significant. A well-organized energy-management program, the handbook shows, can reduce these costs by 20 or more percent.

Four distinct areas where a typical scrap iron and steel facility incurs energy costs are: (1) power for electric motors that run shredders, shears, and balers; (2) fuel for trucks in pickup and delivery; (3) utility services to light, heat, and air-condition buildings; and (4) fuels for furnaces, diesel-powered shredders, and cutting torches.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-006010, price code: A04. For information not provided, contact XENERGY, Inc., 60 Mall Rd., Burlington, MA 01803; (617) 273-5700.

Containerless-Processing Module: Specimens are melted, manipulated, and solidified without contact
See 0610

0757 Corrosion Effects of Mixed Brake Fluids: Addition of new silicone brake fluid to conventional ones does not significantly increase corrosion

Army Materiel Development and Readiness Command,
Alexandria, VA.
Jan 84 *(H)*

A report presents the results of an investigation to determine the corrosive effect of silicone mixed with conventional brake fluid. More than 100 corrosion tests were conducted for the U.S. Army Test and Evaluation Command in accordance with procedures listed in the brake fluid specifications. It was concluded that there is some migration of corrosion inhibitors between fluids, but excessive corrosion would not result. The data generated in the tests, therefore, substantiate the viability of changing from polyglycol brake fluids to silicone brake fluids.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A111936, price code: A02, or contact project officer Charles B. Jordan (301) 278-3677.

0758 Corrosion Inhibitor for Multiple-Metal Cooling Systems: Silicate/nitrite/borate formulation is compatible with aluminum, steel, copper, and other metals

Department of Energy, Washington, DC.
Apr 84 *(F, H)*

A corrosion-inhibitor solution has been developed for use in machine-cooling water in a gas centrifuge plant. The machine-cooling water recirculates in a closed-loop system that removes excess heat from the centrifuges and transfers it to an open-cooling-tower water system, which uses a chromate/zinc/phosphate corrosion inhibitor. Because of the many different types of metal in the machine-cooling water system, the chromate/zinc/phosphate is not appropriate in that loop. The new inhibitor is a mixture of silicate and nitrite, a boric acid/borate buffer, a biocide, and a specific copper-alloy inhibitor.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-003297, price code: A02. For information not provided in the report, contact P.A. Taylor, Oak Ridge Y-12 Plant, P.O. Box Y, Oak Ridge, TN 37830; (615) 574-1965.

0759 Corrosion-Prevention for Steel Stovepipes: Several materials were found to extend the service life significantly

Army Materiel Development and Readiness Command,
Alexandria, VA.
Aug 84 *(H)*

A variety of materials and surface treatments have been evaluated for improving the corrosion resistance of steel stovepipes subjected to harsh environments. The study, conducted for the U.S. Army Materials and Mechanics Research Center, is aimed at finding a cost-effective substitute for a bluing surface treatment that cannot stand up to the heating and cooling cycles of stoves and heaters. The investigated alternatives to blue oxide were a black matte oxide treatment, a black enamel paint coat, chrome plating, a galvanized steel, an aluminized steel, and a stainless steel.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A126617/NAA, price code: A02, or contact project officer Milton Levy (617) 923-3331.

0760 Crack Growth and Toughness in TRIP Steel: Postulated rate equation integrated for specimen geometry is recommended as a method of analyzing crack growth

Army Materiel Development and Readiness Command,
Alexandria, VA.
Oct 84 *(H)*

At present, the method of establishing a rate of crack-growth law is either directly from increments of growth or from slopes of smooth curves drawn through data on crack length versus number of loading cycles. In a study performed by the U.S. Army Materials and Mechanics Research Center, it was found that a postulated rate equation such as the power law can be integrated for the specimen geometry, and when values of the integral corresponding to experimental crack length are plotted against cycles of loading, these lengths can be determined. If the rate equation is valid, the plot will consist of one or more straight lines, for each of which constant parameters can be obtained or, if theoretical, confirmed. Curves and tables of earlier and present results are compiled in a report about this study.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A132021/NAA, price code: A04, or contact project officer Reinier Beeuwkes, Jr. (617) 923-5774.

0761 Crack Growth in Low-Alloy, High-Strength Steel: Model examines environmental and stress effects on crack growth

Army Materiel Development and Readiness Command,
Alexandria, VA.
Jan 84 *(H)*

A model predicting fatigue crack growth in low-alloy, high-strength steel in the presence of aggressive environments and residual stress was studied by the U.S. Army Armament Research and Development Command. Predicted values agree well with experiments when the stress ratio (R) is zero or negative. A correction is needed for cases where R is positive.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A116562, price code: A02, or contact project officer A. J. Kapp (518) 266-5319.

0762 Crack Initiation and Propagation in Alloys: Study characterizes mercury-embrittled aluminum, steel alloys, and brass
Army Materiel Development and Readiness Command, Alexandria, VA.
Oct 84 *(H)*

The rate of crack growth in mercury-embrittled alloys was measured at different temperatures using the short double-cantilevered beam and bend and notched torsion specimen. In tests performed by the U.S. Army Armament Research and Development Command, crack growth was measured using the Compliance Method: both the applied load and the crack-mouth-opening displacement. Crack-growth studies of the aluminum alloy 6061-T651 were made under cyclical loading at two frequencies, under two static loadings, fixed displacement or fixed load, and at several temperatures under all loading conditions. Mathematical expressions that consist of an inert and environmental component were developed.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A129555/NAA, price code: A03, or contact project officer J.A. Kapp (518) 266-5319.

0763 Cracks in Glass Polymers Induced by Solvent Absorption: The combination of soluble particles and absorbed solvents cause polymer cracking
National Aeronautics and Space Administration, Washington, DC.
Jun 84 *(H, J)*

A new failure mechanism in glassy polymers has been identified. It is cracking caused by the presence of particles that are insoluble in the polymer matrix but are soluble in a solvent. The experiments performed and equations that describe the cracking phenomenon are set forth in a concise report. By removing soluble particles from a polymer before it is used in an environment containing the solvent, cracking and subsequent material failure can be avoided. A potential use of the mechanism would be in determining the strength of transparent polymers.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15072/TN.

0764 Creep Tests of Hot Aluminum Alloy: Results of 48-hour tests are presented
Army Materiel Development and Readiness Command, Alexandria, VA.
Jun 84 *(H)*

A series of constant-duration creep and recovery tests has been performed on 2618 aluminum alloy in which stress levels were evenly distributed, from those causing little strain in 48 hours to those causing tertiary creep in less than 1 hour. The tests of type 2618 aluminum alloy at 200C were used not only to check the behavior below the apparent creep limits but also to check the applicability of previous results to longer-term primary creep.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A124993, price code: A03.

0765 Cumulative Fatigue Damage In Composites: The extent of damage is correlated with remaining life expectancy
Army Materiel Development and Readiness Command, Alexandria, VA.
Sep 84 *(H, K)*

A study has been undertaken of the nature of cumulative damage in glass/epoxy composites during fatigue loading and the correlation of the extent of damage with remaining useful lifetime. The study, which was made by the U.S. Army Materials and Mechanics Research Center, found that changes of stiffness in composite-laminate specimens loaded in tension/tension fatigue reflect the extent of accumulated damage. The magnitude of stiffness change can be used to predict the remaining life fraction of specimens. Dynamic structural analysis techniques can be used to follow stiffness changes in substructures and should be valuable in the field for following stiffness losses in composite structures.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-P001915/NAA, price code: A02, or contact project officer Margaret Roylance (617) 923-3514.

0766 Damping Seals for Turbomachinery: Seals perform a dual function while permitting higher speeds
National Aeronautics and Space Administration, Washington, DC.
Dec 84 *(F)*

Seals with rough surfaces are proposed for stabilizing shaft motion and preventing leakage along the shaft in machines such as turbopumps. Ordinarily such seals contribute to instability at higher shaft rotational speeds; with rough surfaces on the seals, however, this effect is eliminated. The dynamic and static parameters of seals with rough surfaces have been analyzed, and it has been shown that shaft stability and leakage are controllable in the presence of high roughness. The proposed seals are simple and should be readily applicable to turbomachinery. Speed limits could be raised and bearing life extended, thus avoiding costly shutdowns.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25834/TN.

Depositing Sialon Coating on Turbine Rotors: Sialon layer is formed on a refractory substrate via chemical-vapor deposition
See 0162

0767 Designing Glass Panels for Economy and Reliability: Method considers such factors as glass temper and load duration
National Aeronautics and Space Administration, Washington, DC.
Jan 84 *(G, H)*

An analytical method determines the probability of failure of rectangular glass plates subjected to uniformly distributed loads such as those from wind, earthquake, snow, and deadweight. Although developed as an aid in the design of protective glass covers for solar-cell arrays and solar collectors, the method should also be useful in estimating the reliability of large windows in buildings exposed to high winds and can be adapted to non-linear stress analysis of simply supported plates of any elastic material. In the past, the minimum allowable thickness has been determined from design curves published by glass manufacturers, but such curves have certain shortcomings. The new method allows the designer to select the glass thickness that will sustain give normal pressure loads at a specified failure rate.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15252/TN.

Determining the Orientation of Anisotropic Materials: Ultrasonics probe the direction of tile fibers
See 0466

Dielectric Scanning Locates Voids in Glass Foam: Capacitive probes may succeed where X-ray and ultrasonic equipment do not
See 0471

0768 Directional Solidification of Monotectic Alloys: Cooling at certain rates produces fibrous composite structures

National Aeronautics and Space Administration,
Washington, DC.
Jul 84 *(H, J)*

Solidification induced by vertical motion through a temperature gradient produces fibrous and tubular composites of two- and three-component alloys with compositions close to that exhibiting the monotectic reaction liquid 1 = solid + liquid 2. At certain cooling rates, all of the binary monotectic systems investigated (Al/In, Cu/Pb, Al/Bi, Cd/Ga, and a transparent analog, succinnonitrile/water) produce fibrous or tubular structures. Directionally solidified samples of monotectic alloys can be selectively etched to remove the fibrous phase, leaving a metallic matrix permeated by parallel, closely packed holes. Sieves or filters of this type have been produced.

FOR ADDITIONAL INFORMATION: Inquiries concerning rights for the commercial use of this invention should be addressed to Leon D. Wofford, Jr., George C. Marshall Space Flight Center, Mail Code: CC01, Marshall Space Flight Center, AL 35812; (205) 453-0020. Other should contact Technology Transfer Division, P.O. Box 8757, BWI Airport, MD 21240; (301)621-0100. In either case refer to MFS-25767/TN.

Dispensing Small Measured Volumes of Liquid: Unit measures, filters, and unloads oil into a container
See 1009

0769 Dissolving Bubbles in Glass: An analytical expression calculates the changes of bubble radius with time

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(H, J)*

An analytical expression is used to calculate the time it takes for stationary bubbles of oxygen and carbon dioxide to dissolve from a glass melt. It is part of a model of the glass-refining process. The technique ignores bubble motion and treats a stationary single bubble composed of one gas in an infinite glass melt. The technique is based on an analytical expression for bubble radius as a function of time, without the consequences of surface tension included. The dissolution rates, which include surface-tension effects, are calculated by numerical integration of the quasi-stationary governing equation.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15105/TN.

0770 Drying Wood With the Sun: Booklet shows how to build a solar-heated firewood dryer

Department of Energy, Washington, DC.
Dec 84 *(C)*

A booklet provides practical advice on burning wood for space heating, with special emphasis on drying firewood with solar energy. Burning wood, however, is not without its problems. Chimney fires occur because of creosote build-up, and air pollution from wood smoke can reach dangerous levels during the winter months. Fortunately, these problems can be avoided if firewood is first adequately dried and then burnt properly. The booklet describes the 'Virginian,' an easily constructed solar-heated firewood dryer for household use. The Virginian is designed much like a passive solar greenhouse. With the Virginian, firewood will dry faster than if it were left in the open air.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-018210/NAB, price code: A03.

0771 Dual-Phase Steel for Low-Temperature Application: Study characterizes the suitability of this steel for Arctic-temperature applications

Department of Energy, Washington, DC.
Mar 84 *(H)*

A study of the structural behavior of dual-phase steel, Fe/1.5Mn/0.06C, has shown the characteristics needed to make this alloy suitable for use in Arctic temperatures; e.g., Arctic pipeline. The conclusions were drawn from researching the role of microstructural factors that influence the impact properties of this steel at low temperatures. The major findings are as follows: controlled rolling followed by quenching of a Fe/1.5Mn/0.06C alloy produces a duplex ferritic/bainitic structure. Both a decrease in the final rolling temperature and an increase in the amount of deformation reduce the ferrite grain size, resulting in greater strength and lower ductile/brittle transition temperature. No expensive microalloying additions are necessary in this process.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-016663, price code: A01 (Microfiche only). For information not provided, contact Gareth Thomas, Lawrence Berkeley Laboratory, University of California, Berkeley, CA 94720; (415) 486-5656.

Eddy-Current Damage Test for Carbon Composites: A nondestructive test method detects cracks in materials of low conductivity
See 0475

Electronic Dilatometer: A nonclamping micrometer measures small strains
See 0479

0772 Energy Absorption in Composite Materials: Crash-resistance potential is found in these materials

Army Materiel Development and Readiness Command,
Alexandria, VA.
Sep 84 *(H)*

A study of the energy-absorption characteristics compared selected composite-material systems with those made from aluminum. The objective of the study, which was sponsored in part by the U.S. Army Aviation Research and Development Command, was to find materials that would improve the crashworthiness of aircraft and perhaps other vehicles as well. Composite compression-tube specimens were fabricated with both tape and woven-fabric preimpregnated material, using graphite/epoxy, Kevlar/epoxy, and glass/epoxy composites. The composite materials were found to absorb energy without catastrophic failure of the specimens.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A129020/NAA, price code: A02.

Energy Conservation in the Textile Industry: Case histories show how energy costs can be reduced and fossil fuels conserved

See 0324

0773 Epoxy Grout With Silica Thickener: Grout cures quickly, even in the presence of hydraulic oil

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(H)*

An epoxy grout lasts long, does not sag, and cures quickly, even in the presence of hydraulic oil. Within several hours after mixing, the grout can bear a load. It can replace portland cement dry-pack grout, which stops curing in the presence of hydraulic oil. The grout is a mixture of aggregate particles, finely-divided silica, epoxy resin, and triethylenetetramine curing agent, with the mixture containing about 85 percent silica and aggregate particles and 15 percent resin and curing agent. The silica is a thickening agent and keeps the grout from sagging.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning license for its commercial development should be addressed to Paul F. McCaul, NASA Resident Office-JPL, Mail Code: 180-601, 4800 Oak Grove Drive, Pasadena, CA 91103; (213) 354-2700. In either case refer to NPO-15202/TN.

0774 Erosion-Resistant Composite Material and Method For Preparation

Department of Energy, Washington, DC.
Jan 84 *(H)*

Excellent erosion resistance to high-velocity coal-oil slurries at 350C and 100 m/s was achieved with a chemical-vapor-deposited (CVD) TiB2 coating on a TiB2-Ni ceramic substrate. The depth of erosion was only 0 to 5.5 mm for a 1-h test run, approaching or equalling that of diamond under similar conditions. The conditions for CVD deposition are still being optimized but are quite straightforward. Laboratory experiments have demonstrated the production of CVD TiB2 coatings that show little or no erosion in the presence of high-velocity coal-oil slurries at 350C.

FOR ADDITIONAL INFORMATION: Contact: D. W. Jared, Oak Ridge National Laboratory, P.O. Box X, Oak Ridge, TN 37830; (615) 574-4192. Refer to 468/XTN.

0775 Estimating the Degree of Cross-Linking in Rubber: A new analysis of both the extension and retraction may give better estimates

National Aeronautics and Space Administration,
Washington, DC.
Jan 84 *(H, J)*

The degree of cross-linking or network chain concentration of rubber is estimated with the aid of a new method. The quantity is needed in studies of the mechanical behavior of rubber. The new method is based on the finding that rubber follows different stress/strain relationships in extension and retraction.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15590/TN.

0776 Fabrication of Graphite/Epoxy Column Elements: Dimensionally precise columns are wound on vertical mandrels

National Aeronautics and Space Administration,
Washington, DC.
Mar 84 *(G, H)*

In a new procedure for fabricating graphite/epoxy column elements, the dry fiber is wound on a tapered aluminum mandrel in a vertical winding machine, and resin is injected between the mandrel and an outer sleeve. The winding and injection are done at elevated temperature to minimize the thermal-expansion problems that arise during curing of the resin.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: LAR-12915/TN.

0777 Fabrication of Structural Cellular Glass: A surface layer is quickly heated and compressed

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(G, H)*

In a manufacturing process for cellular (foamed) glass, a densified skin is formed by heating, then compressing a surface layer. The skin imparts additional strength against bending. The new glass is intended for use in the manufacture of large, low-cost, parabolic-dish solar collectors. A postcellulation approach is employed to obtain the dense surface skin while retaining a low-density glass core.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15731/TN.

0778 Fatigue Life of Notched-Steel Specimens: Fatigue crack growth results are presented for a series of bending tests of high-strength, notched-steel specimens

Army Materiel Development and Readiness Command,
Alexandria, VA.
Dec 84 *(H, K)*

Pressure vessels often have notches that are subjected to cyclic loading, which can cause fatigue cracking. In the same way that compressive circumferential residual stress produced near the inner diameter of an over-strained tube increases the fatigue life, the tensile overload of a notch can increase notch fatigue life. The purpose of a test program was to identify some of the conditions and effects of notch overload. The tests were performed on a high-strength nickel/chromium/molybdenum steel.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A136065/NAA, price code: A02, or contact project officer John H. Underwood (518) 266-4183.

0779 Fire Retardants in Packaging: Wooden boxes and fiber containers for ammunition storage are treated with fire retardant to eliminate spread of fire

Army Materiel Development and Readiness Command,
Alexandria, VA.
Sep 84 *(H)*

Conventional artillery items are usually shipped and stored in paperboard tubes and packed one or more rounds to a wooden box. Studies have been conducted for the U.S. Army Armament Research and Development Center to evaluate the effectiveness of safer packaging methods that would limit the damage from fire. Ammunition fires can be contained and eventually self-extinguished if all the packaging material, including the wooden pallets under the stack and other dunnage are properly treated with a fire retardant. It was found necessary when treating the wooden boxes and pallets that the fire retardant be forced into the wood under high pressure, because in an actual fire a great deal of splintering takes place treated wood to a temperature that can ignite it. Besides being evaluated for fire retarding and thermal conductivity, the treated materials were also evaluated for durability, weathering, preservative qualities, producibility, and cost.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A132233/NA, price code: A04, or contact project officer Robert Fortunato (201) 724-7926.

0780 Fire-Resistant Composites: A resin blend produces high-char-yield, low-smoke composites

National Aeronautics and Space Administration,
Washington, DC.
Mar 84 *(H, J)*

A new compound, diglycidyl ether of bis-(4-hydroxyphenyl)-fluorene(DGEBF), is thermally cured with diglycidyl ether of bisphenol A (DGEBA) to make strong lightweight composites that have good temperature stability and fire resistance. The composites are used to manufacture printed-circuit boards and panels for buildings, ships, and aircraft. DGEBF is prepared by reacting epichlorohydrin, which is commercially available, with 9.9-bis-(4-hydroxyphenyl)-fluorene in the molar ratio of between 7:1 and 10:1; that is, a large excess of epichlorohydrin.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for the commercial use of this invention should be addressed to Darrell G. Brekke, Ames Research Center, Mail Code: 200-11A, Moffett Field, CA 94035; (415) 965-5104. In either case refer to ARC-11331/TN.

0781 Flexure Test for Ceramic Materials: Standards for accurate bend-testing are established

Army Materiel Development and Readiness Command,
Alexandria, VA.
Jan 84 *(H, K)*

A set of standards is available for the four-point and three-point flexure-beam tests used for measuring the fracture strength of ceramics and other brittle materials. The work was conducted for the U.S. Army Materials and Mechanics Research Center. The reference standards are based on assumptions from simple beam theory, which take into account load distributions and stress/strain relationships, relative to the rectangular-beam dimensions, in order to minimize errors associated with beam geometry and test equipment.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A113937, price code: A02, or contact project officer Francis I. Baratta (617) 923-3259.

Forming Mirrors on Composite Materials: Smooth coatings are deposited on hard-to-polish substrates
See 0969

0782 Fracture Resistance in Carburized Steels: Study evaluates carburized steels for high-temperature service in helicopters

Army Materiel Development and Readiness Command,
Alexandria, VA.
Jun 84 *(H)*

A study, performed for the U.S. Army Materials and Mechanics Research Center, investigated the factors governing the fracture resistance of carburized steels and analyzed fracture-resistance changes in these steels after a 1,000-hour exposure to elevated temperatures of 600F. The steels were evaluated for use as carburized gears in helicopter power transmissions. Fracture tests were conducted on five commercially produced steels (SAE9310, X2(M), X-53, CBS1000, and CBS600).

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A116559, price code: A03.

0783 Freeze/Thaw Properties of Cellular Glass: Without moisture, temperature cycles do no harm

National Aeronautics and Space Administration,
Washington, DC.
Jun 84 *(H)*

Cellular glass has been proposed as a substrate for glass reflectors in solar concentractors. Considerable concern among designers has been expressed regarding the environmental degradation of cellular glass in field service, particularly in regard to its resistance to high-humidity freeze/thaw cycles. A set of experiments described in a new report indicates inherent material variability to be a greater deterrent to application of the material than freeze/thaw effects.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15854/TN.

Frictional Hold of Various Sheave Configurations Studied
See 0146

Gas-Pressure Sintering Process: High-performance silicon nitride ceramics are produced
See 0644

0784 Glass Ceramics, Shape Memory, and Ferroelectric Materials: Report presents three results from materials studies

Army Materiel Development and Readiness Command,
Alexandria, VA.
Oct 84 *(H, J)*

Glass ceramics were studied to determine if it is possible to prepare materials which have piezoelectric and pyroelectric properties comparable to those in ferroelectric crystals. These studies were compiled for the U.S. Army Research Office because of the interest in materials that are not subject to performance degradation due to depoling and are also amenable to mass production in large sizes. A strong pyroelectric was measured in glass ceramics of composition Li2O/1.8SiO2/0.2B2O3. It is possible to prepare this material in large-area sizes inexpensively, and it was also found that the electric properties are less sensitive to chemical impurities and defects in the sample.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A128941/NAA, price code: A05.

Glass for Solar Concentrators: A survey evaluates engineering parameters of commercial glasses
See 0334

Graphite/Epoxy Tow Bar: Composite bar is as strong as a conventional steel automotive tow bar
See 1012

0785 Hardening Iron-Based Nickel/Cobalt/Titanium Alloys: Hardness depends on the titanium content and the type of heat treatment

Army Materiel Development and Readiness Command,
Alexandria, VA.

Sep 84 *(H)*

A report for the U.S. Army Materials and Mechanics Research Center describes an evaluation of a new alloy series composed of iron with 9 percent nickel, 9 percent cobalt, and 0 to 5 percent titanium. The general microstructural features and hardness properties were investigated after various heat treatments. The new alloys are characterized by the formation of Laves phases. These are intermetallic compounds of the general formula AB2 that act as strengthening agents. The objective was to develop optimum hardness properties from the formation of Laves phases in a martensitic ferrite matrix (from cobalt), solid-solution strengthened (from nickel) in which precipitation of Laves phases (Fe2Ti or Co2Ti or both) can produce the best hardening properties.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A129782/NAA, price code: A03, or contact project officer Morris Azrin (617) 923-5310.

0786 High-Strength Structural Ceramics: Microstructural flaws are reduced by a new process for making silicon carbide

Army Materiel Development and Readiness Command,
Alexandria, VA.

Apr 84 *(G, H)*

The development of a process for making shaped parts composed of silicon carbide-based ceramic materials was carried out. The process, which is being developed for the U.S. Army Materials and Mechanics Research Center, reduces the size of microstructural flaws by reacting silicon with fine, ultraporous carbon skeletons without the addition of particles. A very fine, uniform-siliconized microstructure has been made from a carbon skeleton with an average pore size of about 1.9 micro m and an apparent density of about 0.85 g/cu cm..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A125857, price code: A03.

Hot-Melt Adhesive Attachment System: An adhesive system is effective on Earth and in space
See 0652

0787 Hydrogen Embrittlement in ESR 4340 Steel: The type of remelt process correlates with susceptibility

Army Materiel Development and Readiness Command,
Alexandria, VA.

Apr 84 *(G, H)*

A report presents a comparison of the hydrogen-embrittlement susceptibility of remelted 4340 steels made by the electroslag-remelting (ESR) and vacuum-arc-remelting (VAR) processes. The comparison was made for the U.S. Army Materials and Mechanics Research Center. Three heat-treatment levels and two grain orientations were evaluated. Three test methods were applied to measure embrittlement susceptibility. All test methods indicated that VAR steel is less susceptible to hydrogen embrittlement than ESR steel. A parallel effort focused on differences in heat-treatment distortion between the ESR and VAR steels.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A122178, price code: A03 or contact project officer Albert Anctil (617) 923-5980.

Improved Silicon-Growth Chamber: Improvements include a better transport mechanism and a better trough heater
See 0654

0788 Improved Thermosetting Imide Resins: The modified resins have a lower curing temperature

National Aeronautics and Space Administration,
Washington, DC.

Oct 84 *(H)*

Imide monomers can be chemically modified to lower their cure temperature by 90 deg, at the least, without compromising the flame resistance of the cured resins made from them. The imide monomers are prepared by reacting tris (m-aminophenyl phosphine oxide) with an unsaturated cyclic anhydride. The properties of the imide monomers are altered by substituting benzophenone tetracarboxylic acid dianhydride. Cured imide resins and composites with high heat and flame resistances are obtained by heating the imide monomers or graphite fibers impregnated with them to curing temperatures of 180C and postcuring temperatures of 220C.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for the commercial use of this invention should be addressed to Darrell G. Brekke, Ames Research Center, Mail Code: 200-11A, Moffett Field, CA 94035; (415) 965-5104. In either case refer to ARC-11368/TN.

0789 Improving Oxide-Dispersion-Strengthened Alloys: Study examines ways to improve high-temperature performance and production techniques of NiCrAlY alloys

Army Materiel Development and Readiness Command,
Alexandria, VA.
Aug 84 *(H)*

A study conducted for the U.S. Army Tank-Automotive Command, examined ways to produce near net-shaped components from oxide-dispersion-strengthened nickel-based alloys with improved high-temperature creep and rupture resistances. The near net-shaped production such as cold or warm forming can eliminate the costly, wasteful machining of the alloys from the extruded bar stock. The production improvements are of interest in the fabrication of high-performance components for gas-turbine engines. The material used in the study contained nominally 20 percent chromium, 0.3 percent aluminum, 0.4 percent titanium, and 0.6 percent yttria (Y_2O_3). Results of the evaluation of several different processing treatments revealed that a combination cold rolling and annealing process allowed the highest degree of reduction while maintaining the favorable grain morphology and high-temperature properties.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A125656/NAA, price code: A04.

0790 Increasing Fluid Compressibility With Plastic Spheres: Suitability of various sphere materials is evaluated

Army Materiel Development and Readiness Command,
Alexandria, VA.
Feb 84 *(D, H)*

A report documents a study of the feasibility of using submicron-size, hollow plastic spheres as an energy-absorbing medium in compressible fluids. The study, conducted by the U.S. Army Armament Research and Development Command, identified the properties of an ideal polymer that would increase fluid compressibility. An engineering analysis of strain and compressibility as applied to a hollow sphere showed that three factors control the compressibility of the sphere: elastic modulus, Poisson's ratio, and relative wall thickness. Polystyrene hollow spheres, although the least compressible, are expected to be chemically compatible with silicone hydraulic fluid.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A117496, price code: A04, or contact project officer R. Dombroski (201) 724-3065.

Inspecting Ingots and Preforms Prior to Hot Forging: Focused ultrasonic beams quickly and rapidly test steel ingots before rotary forging

See 0658

0791 Intercritically Rolled Steels: Dynamic characteristics of these hard, fracture-resistant materials are presented

Army Materiel Development and Readiness Command,
Alexandria, VA.
May 84 *(H)*

A study was conducted of intercritically rolled high-hardness steel. The study, conducted by the U.S. Army Materials and Mechanics Research Center, was made to determine the dynamic characteristics of this type of steel in armor applications. Two steel compositions were studied. In addition to tensile- and fracture-toughness tests, Taylor projectile-impact tests were made. The study found that intercritically rolled homogeneous-armor steel has higher strength and toughness than armor processed by a conventional quench-and-temper treatment.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A116661, price code: A02 or contact project officer Morris Agrin (617) 923-3212.

0792 Interface Reactions in Metal-Matrix Composites: An intermediate layer between fiber and matrix determines the mechanical properties of the composite

Army Materiel Development and Readiness Command,
Alexandria, VA.
Feb 84 *(H)*

A report describes a study of the interface reactions between fiber and matrix materials in graphite/aluminum- and alumina/magnesium-composite systems. The study, which was conducted for the U.S. Army Materials and Mechanics Research Center, found that interface reactions are necessary to promote bonding and wetting between fibers and matrix.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A117741, price code: A03.

0793 Liquid-Oxygen-Compatible Cement for Gaskets: Fluoroelastomer and metal are bonded reliably by a new procedure

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(G, H)*

A procedure using a liquid-oxygen-compatible adhesive bonds Viton elastomer (or equivalent) parts to metal. It can be used to seal gaskets and O-rings, as in its original NASA application, or it might be used to splice layers of elastomer to form non-standard-sized O-rings. Another possible use is to apply a protective, liquid-oxygen-compatible coating to metal parts.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-19797/TN.

0794 Long-Term Corrosion of Zirconium Alloy: Data and a mathematical model are presented

Department of Energy, Washington, DC.
May 84 *(H)*

A report presents long-term corrosion data for the zirconium alloy, zircaloy-4, in a water environment. The report also describes a mathematical model for long-term corrosion. A simple and accurate representation of zircaloy-4 corrosion behavior in a water environment was obtained by analyzing the data in terms of corrosion rate versus total weight gain. This representation can be used to describe long-term behavior and makes it easy to apply the data to engineering problems involving variable time and temperature histories.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-018781, price code: A02. For information not in the report, contact H.

Richard Peters, Knolls Atomic Power Laboratory, River Road, Schenectady, NY 12301; (518) 393-6611.

Low Temperature Properties for Fusion Magnets Are Produced
See 0266

0795 Low-Weight Inserts for Aluminum Honeycomb Panels: Fiber/epoxy composites would be used in place of solid aluminum
National Aeronautics and Space Administration,
Washington, DC.
Mar 84 *(G, H)*

The aluminum honeycomb sandwich panels that reduce weight in aerospace applications often include strengthening inserts at high-stress points, such as attachment points. Current practice is to fashion the inserts out of solid aluminum; however, a new proposal suggests that it may be possible to make the inserts out of such lightweight, high-strength materials as fiber/epoxy composites or high-density aluminum honeycomb..

FOR ADDITIONAL INFORMATION: Inquiries concerning rights for the commercial use of this invention should be addressed to Marvin F. Matthews, Lyndon B. Johnson Space Center, Mail Code AL-3, Houston, TX 77058; (713) 483-4871. Refer to MSC-20227/TN.

Lubricant Effects on Transmission Power Loss: Several lubricants are evaluated for mechanical efficiency
See 1014

Making Food From Sawdust
See 0027

0796 Making Thermoplastics Flame-Resistant: Elastomer-coated hydrate salts are added
National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(H)*

An inorganic hydrate-salt filler coated with an elastomer containing acidic groups imparts flame and smoke retardancy to thermoplastics while preventing the degradation of impact resistance that usually results from high filler loadings in thermoplastics. The elastomer forms a well-bonded elastomeric interphase between the filler and the resin. The elastomer-filled composite fails by shearing or crazing rather than by fracture.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to Paul F. McCaul, NASA Resident Office-JPL, Mail Code: 180-601, 4800 Oak Grove Drive, Pasadena, CA 91103; (213) 354-2700. Refer to NPO-14857/TN.

0797 Marine Corrosion Work Continues
Department of the Navy, Washington, DC.
Feb 84 *(NTISNTND)*

The David Taylor Naval Ship Research and Development Center is conducting corrosion experiments in natural seawater. Equipment has been developed and used to study the behavior of materials as specimens, components, or system mock-ups in seawater. One on-going project explores the relationship between short-term electrochemical testing and long-term galvanic corrosion rates. Another project involved 36 wrought and 9 cast commercial molybdenum-containing stainless steels and nickel alloys.

FOR ADDITIONAL INFORMATION: Contact: Navy Technology Transfer Fact Sheet, Code E411, Naval Surface Weapons Center, Dahlgren, Virginia 22448. Refer to 080905.

0798 Materials for Fluorine-Rich Environments
Department of Energy, Washington, DC.
Aug 84 *(H, J)*

A comprehensive materials-screening program identified candidate refractories that are the most fluorine-resistant at high temperatures (>1000 K). Corrosion protection depended on the formation of a adherent fluoride film. Using a 2F2 1H2 environment, lanthanum boride (LaB6)-based ceramics were the best materials tested--with a LaB6-10 vol % carbon composite exhibiting excellent stability. Materials were identified. Nozzles and combustion chambers were fabricated, and prototype performance characteristics were established. The primary interest was for potential use of hydrogen fluoride (HF) chemical lasers. However, the information is applicable to all fluorine-rich environments for containment and transport at high temperatures.

FOR ADDITIONAL INFORMATION: Contact: Office of Technology Applications, Oak Ridge National Laboratory, P.O. Box Y, Oak Ridge, TN 37831; (615) 574-3896. Refer to 494/Y/TN. Information regarding nonexclusive or limited exclusive licensing is available from the Assistant General Council for Patents, U.S. Department of Energy, Washington, D.C. 20545. Refer to PAT-4, 309, 461/TN.

0799 Measuring Additive Concentrations in Lubricating Oils: Nuclear magnetic resonance provides qualitative and quantitative information on key additives
Army Materiel Development and Readiness Command,
Alexandria, VA.
Aug 84 *(H, J, K)*

A report describes a new spectroscopic method for measuring the amounts of zinc dialkyldithiophosphate (ZDDP) in lubricating oil. ZDDP's are added to engine lubricants because of their pressure-resistant, antiwear, antioxidant, and corrosion-inhibiting properties. The new analytical method helps ensure that ZDDP is present in the proper amount. The method, developed for the U.S. Army Mobility Equipment Research and Development Command, uses nuclear magnetic resonance (NMR) to detect the presence of phosphorus 31.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A129003/NAA, price code: A03, or contact project officer Shing-Bong Chen (703) 664-3576.

Measuring Coating Thickness: A gage measures the coating thickness in holes
See 0515

0800 Measuring Elastic Modulus of Sintered Metal: Technique minimizes the effect of the substrate on a thin sintered coating
National Aeronautics and Space Administration,
Washington, DC.
Apr 84 *(H, K)*

A uniaxial tension test yields an approximate value for the elastic modulus of a sintered material on a thin substrate. The test method is more useful than the bending tests previously used. The new test uses uniaxial tension instead of bending. Strictly speaking, the stress experienced by the specimen is not simply a uniaxial tension but is more closely related to a triaxial tension. The departure of the state of stress from uniaxial to triaxial increases as the ratio of thickness to stressed cross-sectional area decreases. However, if the ratio is kept constant, accurate comparative data can be obtained on a variety of specimens.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15589/TN.

Measuring Epoxy-Curing Kinetics: Key reaction parameters are estimated from a single run
See 0110

0801 Mechanical Property Characterization of 4340 Steel: Forgings made from split argon/oxygen decarburized (AOD) heat of 4340 steel are compared for ballistic and mechanical properties

Army Materiel Development and Readiness Command, Alexandria, VA.
Nov 84 *(H)*

The hydraulic actuators, rotor pitch links, bearing sleeves, and crank assemblies in attack helicopters are made from 4340 steel that can withstand both a ballistic impact and the usual mechanical stresses. While the electroslag-remelted (ESR) 4340 steel has been chosen for these applications because of its superior ballistic properties, there have been variations in ingots supplied for processing, which meant that the ingots did not meet the hardness specifications. In a study conducted by the U.S. Army Materials and Mechanics Research Center, ESR and vacuum-arc-remelted (VAR) ingots made from the same batch of AOD heat of 4340 steel were compared for the differences in mechanical and metallurgical properties.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A131258/NAA, price code: A02, or contact project officer Albert A. Actil (617) 923-5206.

0802 Metal Coating Multifilamentary Yarns: Process provides uniformly coated fibers for reinforcing high-temperature composites

Department of Energy, Washington, DC.
Mar 84 *(G, H)*

Long lengths of carbon, metal, ceramic, and graphite yarns are coated with a refractory metal in a continuous chemical-vapor deposition (CVD) process. The resulting metal-coated fibers are flexible enough to be woven and hot-pressed into heat-resistant structures of fiber-reinforced ceramic matrix composite. Conventional methods form brittle product and do not ensure against voids and gaps in the coating, which can lead to degradation at high temperatures. The process consists of reacting a metal halide and hydrogen gas with a counter-currently drawn yarn in a three-zone furnace. Any volatile halide of tantalum, niobium, molybdenum, tungsten, or rhenium can be generated in situ and used for coating.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,343,836, which is available from: Commissioner of Patents, Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, US DOE, Washington, DC 20585.

0803 Modified Antifreeze Liquids for Use on Surfaces: Viscosity agents and antifreeze liquids are evaluated

National Aeronautics and Space Administration, Washington, DC.
Mar 84 *(D, H, J)*

Viscosity modifiers can substantially improve the effectiveness of antifreeze compounds in preventing frost formation on cold surfaces. Unmodified antifreeze liquids tend to drain away too rapidly. However, when they are combined with such viscosity modifiers as gelling agents, antifreeze liquids adhere to surfaces and perform their intended function. A report presents results of an evaluation of two antifreeze liquids, dimethyl sulfoxide and ethylene glycol, and five viscosity modifiers: gelatin, gum tragacanth, starch, agarose powder, and citrus pectin.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25741/TN.

Modified Oscillograph for Impacting Composite Materials: A commercial instrument is modified to impart energy in a realistic manner
See 0531

Moisture-Transmitting Polymers: The vapor transmissivity and physical properties of hydrophilic polyurethane films qualify them for a variety of applications
See 0113

Monitoring Lignin Content in Paper Processing: Feedstock and finished pulp can be analyzed and controlled automatically
See 0114

0804 More Durable Tread for Tracked Vehicles: Aramid fibers added to tread rubber seem to increase durability

Army Materiel Development and Readiness Command, Alexandria, VA.
Nov 84 *(H)*

The tread rubber on tracked vehicles is subjected to forces that cause chipping and chunking as well as abrasion that eventually wears it. In a program conducted for the U.S. Army Tank-Automotive Command Research and Development Center, it was observed that Kevlar 29, or equivalent aromatic polyamide fibers, added to the rubber triblend tends to strengthen the tread rubber compound for field service in tracked vehicles. The rubber triblend is a blend of natural rubber, butadiene-styrene rubber, and polybutadiene rubber. Kevlar 29, or its equivalent features very high tensile and modulus values which made it suitable for tire cords, ropes, cables and for reinforcing fabrics. After experimenting with mixing procedures researchers achieved good dispersion by a three-pass mix that required a careful order of ingredient addition.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A132415/NAA, price code: A02.

0805 More-Uniform Heat Curing for Structural Repairs: A copper lining helps to distribute the heat under a heating blanket

National Aeronautics and Space Administration, Washington, DC.
Mar 84 *(D, G)*

Repairs and the construction of large structures made of graphite/epoxy composites or other materials are aided by a technique that ensures more uniform heating during curing. A layer of copper sheet is placed between the heating blanket and the structure. Since the copper has a much higher heat conductivity than do typical composite structural materials, the copper smooths the uneven temperature distribution that would otherwise result from hotspots in the heating blanket. The method is applicable to uniformly heating such low-thermal-conductivity metals as titanium or stainless steel.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB83-925703, price code E02.

Neutron Scattering Is Used To Study Structures In Epoxies
See 0116

New Superplasticizers Are Being Used In Concrete
See 0151

0806 Nonliquid Process Prepares Plastics for Electroplating: Gaseous-phase preparation is much simpler than conventional liquid-phase preparation
Department of Energy, Washington, DC.
Sep 84 *(B, G, H)*

A nonliquid method has been developed for preparing nonconductive surfaces -- such as those of printed-wiring boards or flexible wiring -- for electroplating. The new method eliminates a complex multibath wet-chemical process. The new nonliquid method requires only seven steps to prepare a surface. The necessary material is deposited on the electroplating surface from gaseous reactions. Butt-tensile tests were made to determine the bond strengths of the deposited metal layers. The bond strengths exceeded the cohesive strength of the substrate; the polyimide substrate failed before the coating.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-008213/NAB, price code: A02. For information not in the report, contact Gary V. Nesslage, Mound Facility, Monsanto Research Corp., P.O. Box 32, Miamisburg, OH 45342; (513) 865-4052.

0807 Nonpetroleum Substitutes for Rubber: Several blends of reinforcement fillers are evaluated
Army Materiel Development and Readiness Command, Alexandria, VA.
Jul 84 *(H)*

Nonpetroleum-derived rubber fillers have been evaluated as potential replacements for carbon black, which is used for reinforcement in rubber blends used for high-strength, high-abrasion-resistant applications. The work was conducted for the U.S. Army Tank-Automotive Command. The fillers investigated included lignin (a byproduct of a paper-pulp process), a material consisting of hollow silicate microspheres, another material consisting of complex aluminum silicates in the form of pyrogenic microspheres, a silane-treated, hydrated aluminum silicate in the form of particles, a material comprised of bituminuous fine black, a surface-treated cellulosic material, and a hydrated silica powder. Results of abrasion resistance, tensile strength, and chunking and chipping tests revealed that blends having a combination of nonpetroleum fillers with carbon black gave equivalent or superior performance than the blends consisting of all petroleum-based constituents. Improvements in processing characteristics, such as lower plasticity and longer scorch times, were also obtained for the nonpetroleum compounds.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A119170/NAA, price code: A04, or contact project officer Jacob Patt (313) 574-6378.

Oxidation-Resistant Columbium Nozzles: Investment casting and silicide coating are combined to yield strong heat-tolerant parts for gas turbines
See 0168

Perfluoroalkylene-Ether Triazine Elastomers: New process yields a product that resists heat and the action of oxygen and water
See 0123

0808 Plasma Treatment of High-Strength Fibers: Continuous process yields large quantities of wettable fibers for lamination
Department of Energy, Washington, DC.
Nov 84 *(G, H)*

A report describes a system for continuous plasma treatment of Kevlar 49 aramid, an aromatic polyamide fiber with high tensile strength used in composites. The system demonstrates that moisture can be removed from the fibers by passing them through the continuous plasma. It is well known that the adhesion of a resin binder to the fiber filaments is poor because of poor wettability of the filament surface. The continuous plasma treatment makes large quantities of fiber available. Adhesion test results with plasma-treated, unidirectional Kevlar 49 laminates showed an improvement in adhesion ranging from 1.4 to 3.7 times.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE84-000314/NAB, price code: A03.

Plastic-Sealed Hybrid Power-Circuit Package: Concept uses a plastic hermetically sealed package
See 0278

Plating Process to Improve Use of Chromium Has Been Developed
See 0683

0809 Polymeric Applications in Electronics: A training manual shows how to use polymeric materials in fabricating electronic components
National Aeronautics and Space Administration, Washington, DC.
Oct 84 *(B, H)*

A 148-page report discusses polymeric applications in the fabrication of electronic components and equipment. It is intended as a training manual for a 6-day quality-assurance and technician certification course in the use of polymeric materials. Various polymers are employed in electronic packaging as embedding resins, organic protective and insulating coatings, and adhesives. The training manual establishes a uniform method for the use of these materials. The manual stresses the importance of cleanliness, the effects of static discharges, and the proper methods for handling toxic chemicals. Material selection is given in a table, listing the usage and type of material suggested.

FOR ADDITIONAL INFORMATION: Further information may be found in 'Quality Assurance Training and Certification Program, Polymeric Applications' ($25). A paper copy may be purchased (prepayment required) from the NASA Industrial Applications Center, University of Southern California, Research Annex, 3716 South Hope Street, Los Angeles, California 90007.

Predicting Life of Ceramic Components in Gas Turbines: Experimental and analytical results are compared
See 0170

0810 Predicting Sintered-Metal Resistivity From Porosity: An equation with one adjustable parameter fits the experimental data for nickel

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(H, J)*

A formula with one adjustable parameter relates the electrical resistivity of a sintered metal plate to the porosity of the plate. A sintered plate is formed by heating compressed metal powder -- without melting -- until the particles adhere. Sintered nickel plates of high porosity are used as substrates for the electrodes in nickel/cadmium batteries. The formula gives the ratio of the resistivity of the sintered material to the resistivity of the solid bulk metal. While the formula should be applicable to sinters of various metals, it has been tested for sinters made from nickel carbonyl powders.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15587/TN.

0811 Predicting Thermal Conductivity: An empirical equation accurately predicts thermal conductivity in insulating materials

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(H, J)*

An empirical equation predicts the thermal conductivity of composite insulators consisting of cellular, granular, or fibrous material embedded in a matrix of solid viscoelastic material. The thermal and physical properties are varied for use in different environments by changing the volume ratio of the components. Calculations show a one-percent difference between the predicted and the experimental values of thermal conductivity. The equation may find application in designing custom insulators for particular environments.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25732/TN.

0812 Preparation of Steel Specimens for Inclusion Assessment: Two metallographic sample preparation methods produce flat, scratch-free surfaces without losing the inclusions

Army Materiel Development and Readiness Command,
Alexandria, VA.
Dec 84 *(H, K)*

Inclusions in steel samples must remain intact as the sample surfaces are prepared flat and scratch-free for metallographic evaluation. In a study performed by the U.S. Army Armament Research and Development Command, two metallographic sample preparation procedures were developed that produce flat, scratch-free samples without altering the inclusions. In the first method, mounted samples were ground on manual or automated disks under a rinsing, cooling stream of water; cleaned; and dried. In the second procedure, samples were handground on glass under a stream of water.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A136147/NAA, price code: A02.

Preventing Moisture Damage to Bituminous Materials: Damage inhibitor is abundant in shale oil
See 0152

0813 Process for Molding Nonreinforced (Neat) Resins: Void-free moldings are obtained for neat, condensation, thermosetting resins

National Aeronautics and Space Administration,
Washington, DC.
May 84 *(G, H)*

A problem associated with the molding of nonreinforced, condensation, thermosetting resins such as phenolics and polyimides is the control and removal of volatiles. A process was developed for producing solid, void-free, neat resin parts from condensation, thermosetting resins. It consists essentially of thermally and mechanically treating the resin prior to molding to reduce the amount of volatiles. With the volatiles reduced, the molding temperature and pressure are applied in such a way as to drive out the remaining volatiles during molding.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB83-925805, price code E02.

0814 Producing Metallic Glasses With Acoustic Levitation: Acoustic fields support and cool liquid particles

National Aeronautics and Space Administration,
Washington, DC.
Aug 84 *(G, H)*

Very little contamination would occur in an acoustic-levitation scheme under development for cooling molten metal. The scheme may allow new amorphous alloys -- including 'metallic glass' -- to be formed. The melt for a metallic-glass-forming material must be cooled rapidly, before a crystalline structure has time to form. In the new method, a focused bidirectional acoustic levitating field gives rise to streaming in the atmosphere surrounding the levitated molten drop. The cooling rates thus far measured and estimated for acoustic levitators appear to be adequate for metallic-glass formation. Many alloy systems that cannot be made amorphous with existing techniques may be suitable for glass formation when the cooling-rate requirement is reduced by the contactless method.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15658/TN.

0815 Properties of Nickel/Titanium Wire and Tubing: Data on two useful forms of shape-memory alloy are presented

Department of Energy, Washington, DC.
Apr 84 *(H)*

A pair of reports provides quantitative information on the material -- Nitinol, a class of nickel/titanium alloys in which the constituents are present in near-equiatomic amounts. One report deals with nickel/titanium wires; the other, with nickel/titanium tubes. Among the reasons for the wide interest in nickel/titanium are its applications as power, elements in low-temperature heat engines, couplings for hydraulic tubing, orthodontal wire, biomedical implants, and in other diverse functions. In many of these applications, the nickel/titanium must perform satisfactorily under conditions of repeated combined cycles of stress and temperature. Resistivity was investigated as a function of tensile stress in equiatomic nickel/titanium wires in the uncycled condition and after millions of stress/temperature cycles.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order numbers: DE82-018272 and DE81-029838, price codes: A03 and A02. For information not in the report, contact Monroe S. Wechsler, Iowa State University, Department of Materials, Science and Engineering, Ames, IA 50011; (515) 294-1214.

0816 Properties of Wet Kevlar/Epoxy Composites: Wet and dry materials are compared and reasons for differences are explored

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 84 *(H)*

A report describes a study of the effects of moisture on the mechanical properties of a unidirectionally reinforced Kevlar/epoxy composite material. Tests showed that the dry material has a glass-transition temperature of 205C and the wet material, 150C. Furthermore, the absorption of moisture decreases the yield stress by 50 percent but increases the strain at failure by 15 percent. The mechanism of fatigue failure was found to be the same in both wet and dry samples.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A131132/NAA, price code: A07, or contact project officer Margaret E. Roylance (617) 923-5514.

0817 Pulsed Electrodeposition of Alloys: Chemical composition versus thickness profile of plated alloys improved using pulsed plating

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 84 *(H)*

Plating techniques that use high current densities result in detrimental structures forming in the deposited alloys. In an investigation carried out for the U.S. Army Research Office, two improvements were made in plating using a pulsed electrodeposition method: the enhancement of chemical-composition variations with thickness and the elimination or reduction of variations in the chemical composition with deposit thickness. Additional findings have shown that deposits consisting of layers with the same chemical composition and phase but different grain size that are produced by different size pulses had high ductility.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A132848/NAA, price code: A02, or contact project officer Phillip Parish (919) 549-0641.

Quenching Alloys in Containerless Processing: Gas quenching would be combined with magnetic levitation
See 0693

0818 Radiation Improves Materials Bonding: Bonds with fluorocarbons are made without surface preparation

National Aeronautics and Space Administration, Washington, DC.

Nov 84 *(G, H)*

Irradiating rubber-based adhesives produces a strong adhesive bond with fluorocarbons without extensive surface preparation. In test runs, cloth tape with rubber-based adhesives adhered strongly to fluorocarbon surfaces after the tape was exposed to cobalt-60 radiation. Adhesive-backed cloth tape in contact with a fluorocarbon substrate was exposed to 400,000 rads. The bond produced was so strong that the bonded area was damaged when extreme force was used to try to break the bond. The method may also be used to restore adhesive strength after some bond strength is lost.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-14995/TN.

Random Life Curves for Common Engineering Materials: Program incorporates non-Rayleigh effects in evaluating structure life
See 0984

Rapid Solidification Processing Research Atomizer Constructed
See 0555

Rare Earth/Cobalt Permanent Magnets: Magnets allow significant simplifications in circuit design
See 0285

Reducing Energy Costs in the Plastics Industry: A variety of simple, fast-payback methods are suggested
See 0364

Reinforcement for Stretch Formed Sheet Metal: Metal reinforcement is flame-sprayed on the edges gripped in the stretch-forming setup
See 0695

0819 Removable Foam Encapsulants: Thermoplastic potting compound can be dissolved when necessary

Department of Energy, Washington, DC.

Aug 84 *(B, H)*

A report describes the use of two expandable bead foams as solvent-removable encapsulants. The materials, Styropore BF-414 and Dytherm X214, are commercially available and are normally used in insulating applications. Now, however, they have been adapted for encapsulating sophisticated and expensive electronic hardware that must sometimes be reworked. Foam densities ranging from 0.10 to 0.65 g/cu cm are possible, providing the design engineer with a wide latitude of mechanical properties.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-017026/NAB, price code: A02. For information not provided in the report, contact: Kenneth B. Wischmann, Sandia National Laboratories, Division 7472, Albuquerque, NM 87185; (505) 844-7532.

Removing PCB's From Oils: Contaminated oil can be cleansed and recycled, and the PCB's disposed of in the prescribed manner
See 0428

0820 Rewaterproofing Silica Tiles: A waterproofing agent is deposited deep into pores
National Aeronautics and Space Administration, Washington, DC.
Feb 84 *(G, H)*

A new technique applies waterproofing agents to silica tiles. Originally developed to rewaterproof surface-insulation tiles of the Space Shuttle orbiter, the technique might also be used to waterproof concrete brick walls, and other porous articles. The rewaterproofing system includes a gas supply of any nonreactive gas, such as N2. The N2 gas flows through a flowmeter to a bubbler where it entrains some of the waterproofing agent and carries the agent to the surface. The entrained waterproofing agent then flows into the tile through a small hole in the tile coating. The waterproofing agent used is hexamethlydisilazane. Other waterproofing agents can also be employed, including methyl-trimethoxy-silane, which requires activation with acids, such as acetic acids.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to Marvin F. Matthews, Lyndon B. Johnson Space Center, Mail Code: AL-3, Houston, TX 77058; (713) 483-4871. For either case refer to MSC-20340/TN.

0821 Rhenium Prevents Corrosion: Thrust chamber is protected from corrosive fuel during burns
National Aeronautics and Space Administration, Washington, DC.
Oct 84 *(H)*

A rhenium layer inside a carbon-composite thrust chamber prevents corrosion when a liquid fluorine/hydrazine rocket engine is fired. This type of liner may also eliminate erosion of solid-propellant carbon nozzles. The rhenium is vapor deposited inside the thrust chamber. It acts as a barrier between the ammonia and the carbon during chamber operation.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15011/TN.

0822 Rotatable Vacuum-Seal Assembly: Seal retains vacuum without friction between the rotor and the stator
Department of Energy, Washington, DC.
Nov 84 *(F)*

A rotatable vacuum-seal assembly is designed for a unit that rotates targets against particle beams in accelerator-beam experiments, where rotation speeds reach about 5,000 rpm. The seal retains vacuum between the internal chambers of the rotor and the stator and at the same time operates off air pressure to minimize friction between the rotating parts. The design, in addition, features relatively-inexpensive ball bearings, which sustain the rotating loads better than the air-bearing assemblies. The seal is a flat, ring-shaped assembly mounted on the rotor.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,361,332, which is available from: Commissioner of Patents, Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For further information, contact: C. M. Logan, University of California, Lawrence Livermore National Laboratory, P.O. Box 808, Livermore, CA 94550; (415) 422-1888.

0823 Samarium Alloys for Permanent Magnets: These materials offer the potential for high-performance, lightweight magnets for electronic devices
Army Materiel Development and Readiness Command, Alexandria, VA.
Feb 84 *(B, H)*

A report discusses the investigation of magnetocrystalline anisotropy in two systems, samarium/cobalt/iron and samarium/manganese/cobalt/iron, which are potentially suitable for permanent-magnet applications. In the investigation, which was conducted for the U.S. Army Electronics Research and Development Command, the anistropy fields and saturation magnetizations were measured for both systems at temperatures of 4.2 and 300 K in applied fields up to 100 kOe. The presence of manganese in the second system was found to raise the anisotropy by as much as 55 percent and decrease the saturation magnetization by 5 percent. There are many potential uses for permanent magnets in millimeter-wave and microwave devices that are presently not viable because high-performance requirements are coupled with severe restrictions on weight and bulk. However, many of these needs could be satisfied if permanent-magnet materials with energy products in excess of 30 MOe were available commercially.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A109952, price code: A02.

Sample Holder for Cryogenic Adhesive Shear Test: Five samples would be tested in one cooldown
See 0558

0824 Selection Factors for Plastics: General guidelines and specific examples are presented
Army Materiel Development and Readiness Command, Alexandria, VA.
Mar 84 *(H, J)*

A guide of selection factors is available for evaluating the suitability of polymer materials for a given application. The report, prepared by the U.S. Army Missile Command, covers thermoplastics that can be softened and resoftened without undergoing chemical change and thermosetting resins that undergo a chemical change with application of heat and pressure and cannot be resoftened. The selection criteria are divided into mechanical, thermal, electrical, and physical properties; effects of environment, and processing methods.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A117014, price code: A02, or contact project officer Aubrey Rogers (205) 876-3498.

0825 Self-Cleaning Tubular-Membrane Module: Cleaning proceeds continuously, without hindering processing
National Aeronautics and Space Administration, Washington, DC.
Feb 84 *(D)*

Tubular membranes of the type used to concentrate milk, sugar solutions, and soup - and in many other food- and drug-processing applications - may be made self-cleaning with the aid of a flow-reversing valve. The proposed scheme is expected to reduce the frequency and duration of shutdowns for cleaning. The method has been suggested as a solution to some nagging problems in membrane processing: the clogging of membrane pores, the formation of a hard gel layer on the membrane surface and, changes in the structure of the membrane material. In the new method, sponge balls scrub the membrane surfaces as they travel inside the membrane tubes.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15245/TN.

0826 Shielding Effectiveness Measuring Techniques Are Investigated

Department of Commerce, Washington, DC.

Dec 84 *(B, H)*

Composite materials, such as plastics impregnated with metal, have come into widespread use in applications ranging from airplane frames to computer terminal cases. Composites are favored because they are lighter, stronger, and less expensive than metal. How effective are these materials in shielding electronic components from electromagnetic radiation or in preventing the leak of excessive radiation. How can this effectiveness be measured. These questions are currently undergoing examination at the National Bureau of Standards. Several recent NBS technical papers discuss shielding effectiveness measurement results.

FOR ADDITIONAL INFORMATION: For copies of 'Preliminary Investigations into Shielding Effectiveness Measurement Techniques' and/or 'Some Problems Associated with Interpreting Shielding Effectiveness Measurement Results,' contact Fred McGehan, Division 360.2, National Bureau of Standards, Boulder, CO 80303; (303) 497-3246.

0827 SiC-AlN Ceramics: New ceramic material for diesel engine application is characterized

Army Materiel Development and Readiness Command, Alexandria, VA.

May 84 *(H)*

The results of a preliminary study are available on the fabrication and characterization of SiC/AlN ceramics. The work was conducted for the U.S. Army Research Office, SiC-AlN ceramic materials differ from other related silicon carbide alloys in that SiC-based solid solutions are formed. The ceramic is prepared by carbothermal reduction of silica and alumina in an atmosphere of nitrogen to form the SiC/AlN powder. Analysis of the material revealed that Young's modulus of elasticity varies linearly with composition as well as the coefficient of thermal expansion..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A125968, price code: A02.

0828 Silicon Carbide-Based Structural Ceramics: Process produces strong silicon carbide ceramics

Army Materiel Development and Readiness Command, Alexandria, VA.

Jan 84 *(G, H)*

A recently developed process produces shaped silicon carbide-based ceramic materials with reduced microstructural-flaw size by in situ reaction with fine, ultrauniform pored carbon skeletons. The carbon skeletons are produced from liquid polymer solutions without particulate additions. The development and the evaluation of this process were conducted for the U.S. Army Materials and Mechanics Research Center. In this process low-viscosity polymerizable liquids are cast to the desired shape. The polymerized item, which can be further shaped by machining, is then pyrolyzed to form a fine, very uniform carbon skeleton. The parameters for controlling the skeleton formation, such as maximum carbon particle size, degree of carbon crystallinity, pore size, and pore volume, are all regulated chemically by varying time, temperature, and concentration.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A114834, price code: A04.

0829 Singularities in Laminated Composites: Stress concentrations at free edges and contact edges are analyzed

Army Materiel Development and Readiness Command, Alexandria, VA.

Jan 84 *(D, H)*

A report, prepared for the U.S. Army Materials and Mechanics Research Center, presents an analysis of stress singularities at the free edge and contact edge of an interface in a laminated composite. The unusually large - and sometimes infinite - stress at these edges is one of the factors responsible for delamination when the composite is subjected to external loading. For example, mechanical joints in structures made of composites have stress risers around the bolt holes because of such singularities.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A116439, price code: A05 or contact project officer John F. Dignam (617) 923-3700.

0830 Solidifying Bi/MnBi at Low Gravity: The intrinsic coercivity of the manganese/bismuth system comes close to the theoretical maximum

National Aeronautics and Space Administration, Washington, DC.

Mar 84 *(H)*

According to a new report, the directional solidification of Bi/MnBi magnetic alloy under low gravity enhances its magnetic properties. The magnetic properties of low-gravity Bi/MnBi alloy make it an attractive material for use in motors and other small electrical and electronic components. Samarium/cobalt alloys have filled this need to some extent, but the high cost of samarium prohibits widespread use. If Bi/MnBi can be made economically under near-zero-gravity conditions -- in an orbiting space factory, for example -- the cost of compact, lightweight magnetic parts may decrease. Rods made at about one ten-thousandth of normal Earth gravity exhibited an intrinsic coercivity of 97 percent of the theoretical maximum of 35,000 oersteds.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25736/TN.

0831 Solvent-Resistant Polysulfones: Polysulfones terminated with trimethylsilylethynyl, ethynyl, and phenylethynyl groups have increased solvent resistance

National Aeronautics and Space Administration, Washington, DC.

Sep 84 *(H, J)*

Polysulfones are widely-used commercially available thermoplastics. They are generally amorphous and creep under load at elevated temperatures. A more severe shortcoming is their sensitivity to solvents, especially when stressed. Because of the solvent-sensitivity problem, conventional polysulfones cannot be used in such applications as adhesives or composite matrices on commercial airplanes. Composites on aircraft are exposed to such solvents as hydraulic and deicing fluids, fuel, and paint strippers. In a new technique, polysulfones of various molecular weights terminated with trimethylsilylethynyl, ethynyl, and phenylethynyl groups are prepared. Upon the application of heat, with or without a catalyst, these end groups react to provide cross-linking and chain extension. As a result, the use temperature of the polymer is increased, and, more importantly, the solvent resistance is greatly improved relative to conventional polysulfones. These improvements are achieved without severely compromising the attractive features of thermoplastic polysulfones, such as toughness and thermoformability.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to Howard J. Osborn, Langley Research Center, Mail Code 279, Hampton, VA 23665; (804) 827-3725. In either case refer to LAR-12931/TN.

0832 Standards for Epoxies Used in Microelectronics: Report has significant commercial applications

National Aeronautics and Space Administration,
Washington, DC.
May 84 *(B, H)*

Improved qualitification standards and test procedures for epoxy adhesives used in the assembly of high-reliability hybrid microcircuits are listed in a new report. The objective of the standards is to resolve problems in the areas of outgassing, bond shear strength, corrosivity, volume resistivity, ionic impurities, electrical stability, and the frequency of qualification testing. Eight epoxy adhesives -- four conductive and four insulative -- were tested to develop data for specification requirements. The test findings are included. The report includes estimates of the cost and the time required to perform the user and supplier qualification tests.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25810/TN.

0833 Stress-Corrosion Cracking in Martensitic PH Stainless Steels: Precipitation-hardening alloys are evaluated in marine-environment tests

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(H)*

A report describes marine-environment stress-corrosion cracking (SCC) tests of three martensitic precipitation-hardening (PH) stainless-steel alloys. Specimens with various grain orientations were stressed at 25 to 100 percent of their yield strength during the tests. The SCC resistance of the alloys ranged from low to high among specimens from various mill heats. For each test condition, the report lists the number of failed specimens (ones that fractured), the elapsed time to failure, and the total number of specimens tested. Photomicrographs and scanning electron microscope micrographs generally show more stringers and carbide precipitates in specimens from heats more susceptible to SCC. Tables of the mechanical properties and chemical analyses of the steels are also included.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25400/T.N.

0834 Stress-Corrosion Cracking of Certain Aluminum Alloys: The SC resistance of new high-strength alloys is tested

National Aeronautics and Space Administration,
Washington, DC.
Jun 84 *(H)*

A research report describes progress in a continuing investigation of stress-corrosion (SC) cracking of some aluminum alloys. The objective was to compare the SC behavior of the newer, high-strength alloys (7475-T7351, 7050-T73651, and 7049-T7351) with that of the established SC-resistant alloy, 7075-T73. Tests were conducted with both smooth and precracked specimens.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25773/TN.

0835 Stronger Carbon Fibers for Reinforced Plastics: New process makes fibers 70 percent stronger at lower carbonization temperatures

National Aeronautics and Space Administration,
Washington, DC.
May 84 *(G, H)*

Carbon fibers produced at low carbonization temperatures for carbon-reinforced plastics are stronger when produced by a new technique. Novel features of the new method are a pretreatment in a gaseous or liquid conditioning material, such as benzoic acid, and the addition of a small amount of acetylene to the usual nitrogen atmosphere in the final carbonization step. The starting material, as in the standard process, is polyacrylonitrile filaments.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: ARC-11261/TN.

0836 Studies of the Inverted-Meniscus Deposition of Silicon on Ceramic: Controlled temperature profiles are essential to the production of solar cells

National Aeronautics and Space Administration,
Washington, DC.
Aug 84 *(C, G)*

Studies of the inverted meniscus process for depositing silicon coatings on ceramic substrates are described in a new report. When fully developed, the process will be used to manufacture low-cost solar photovoltaic cells. In the SCIM (silicon-coating-by-inverted-meniscus) process, a substrate of mullite (an orthorhombic aluminum silicate) is pulled through the meniscus at the top of a crucible of molten silica. Silicon adheres to the bottom of the substrate. The process design must simultaneously meet the competing needs to pull slowly enough to deposit an adequate thickness of silicon, to pull rapidly enough to achieve a sufficient production rate, and to maintain a temperature profile that keeps thermal stresses below the buckling and breaking levels.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15602/TN.

0837 Tensile Strengths of Alumina Fiber Composites: High correlation between experimental and theoretical results is obtained

Army Materiel Development and Readiness Command,
Alexandria, VA.
Oct 84 *(H)*

Alumina fibers have been recognized as a promising composite reinforcement for aluminum and magnesium alloys in high-temperature and chemically corrosive environments. Its properties of elastic stiffness, structural strength, abrasion resistance, and oxidation resistance make alumina comparable to other high-performance fibers such as boron, graphite, and silicon carbide. Due to the brittleness and high variability in strength of the alumina, however, failure strengths of the fibers can only be statistically defined. In a study performed by the U.S. Army Materials and Mechanics Research Center, attempts were made to evaluate the strengths of the fibers and, using these results, predict the strengths of composites reinforced with alumina. Two useful constants were obtained -- a flaw sensitivity constant indicating relatively nonuniform dispersion of flaws and a volume independent failure stress that corresponds to the ideal strength of the fiber.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A126482/NAA, price code: A02, or contact project officer Robert Katz (617) 923-5415.

Ternary Compound Electrodes for Molten-Salt Cells: Corrosion is reduced, and fabrication is simplified
See 0371

0838 Thermal Elastohydrodynamic Lubrication of Spur Gears: Program and analysis predict lubricant film thickness and the variations of dynamic load and temperature

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(A, F, H)*

An analysis and a computer program (TELSGE) predict the variations of dynamic load and surface temperature and the lubricant film thickness along the contacting path of a pair of involute spur gears. The dynamic load is assumed to be not influenced by the lubricant film thickness or by the surface temperature and therefore is analyzed independently.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602; (404) 542-3265. Refer to LEW-13528/TN.

Thermographic Testing of Composite Materials: Techniques and equipment are reviewed
See 0574

Ultrasonic Blending of Epoxy Curing Agents: Method is fast, safe, and proven effective
See 0139

0839 Ultrasonic Corrosion Monitor: Probe has resolution on the order of 0.004 mils

Department of Energy, Washington, DC.
Oct 84 *(D, K)*

A high-resolution ultrasonic technique has been developed for continuously monitoring corrosion film buildup in situ. The technique is applicable to a wide range of materials and environments and can be used to study the corrosion process or monitor component corrosion in an operating plant. The principal components of the monitor are a thin wire probe with sensor zones marked off by such acoustic impedance discontinuities as notches or diameter changes, a magnetostrictive transducer for converting the ultrasonic pulses to electrical pulses, and signal-processing equipment.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-010057/NAB, price code: A03. For information not in the report, contact: R.J. Grossman, Knolls Atomic Power Laboratory, P.O. Box 1072, Schenectady, NY 12301; (518) 393-6611, Ext. 7229.

0840 Walnut Hulls Clean Aluminum: Hulls inflict minimal substrate damage

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(D)*

Walnut hulls were found to be the best abrasive for cleaning aluminum surfaces prior to painting. Samples blasted with walnut hulls showed no compressive stress of the surface. Samples blasted with abrasives such as silicon carbide, silica sand, or garnet showed average compressive stresses of 23.6 to 33.1 ksi. Walnut-hull blasting resulted in the least amount of warpage and gave the smoothest surface. The quality of the repainted surfaces was very similar to a first-time painted surface. When purchased in quantity, walnut hulls were the least expensive abrasive.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-27012/TN.

Waste Oils Fuel Navy Boilers
See 0443

0841 Wear Characteristics of Copper Alloys: Harder alloys show least wear

Army Materiel Development and Readiness Command,
Alexandria, VA.
Jan 84 *(H)*

The sliding behavior of copper alloys on AISI 4340 steel and tantalum disks was investigated by the U.S. Army Armament Research and Development Command. The purpose of the study was to choose the copper alloys which showed the best sliding characteristics on the AISI 4340 steel and tantalum surfaces. Experiments were also conducted on a chromium-plated steel disk. The following copper alloys were tested: oxygen-free, high-conductivity copper, sintered copper, two copper alloys containing iron, two dispersion-hardened coppers, gilding metal (90/10 copper/zinc alloy), aluminum/bronze, and welded-band overlay materials from projectiles. Results of the study show that wear is directly related to the alloy hardness for most alloys tested.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A118379, price code: A03, or contact project officer R. S. Montgomery (518) 266-5741.

0842 Wet-Filament Winding Process: Composite-manufacturing method offers versatility

Army Materiel Development and Readiness Command,
Alexandria, VA.
Aug 84 *(G, H)*

A wet-filament winding process has been developed for replacing metal structural components with composite components. The work was performed for the U.S. Army Aviation Research and Development Command. The principal advantages of filament-wound composite components include reduced weight, fewer fastener parts required for assembly, improved reliability and maintainability, and significant overall cost savings. The process involves winding bands of wet graphite or other polymeric fibers around a rotating mandrel at an angular orientation ranging from 5 to 90 deg relative to the axis about which the mandrel rotates.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A121172/NAA, price code: A09, or contact project officer Joe Pratcher (314) 263-3079.

Wicking Coating for Heat Pipes: Grooves in a porous coating are produced by flame-spraying over a wire mesh
See 0740

MEDICINE & BIOLOGY

Acoustic Tooth Cleaner: An acoustically-energized water jet aids in plaque breakdown
See 0038

0843 Animal Tissue Specimens Available

Department of Health and Human Services, Washington, DC.

Jun 84 *(E)*

Tissue samples from laboratory animals with tumors and other lesions are available from autopsy collections at the National Cancer Institute (NCI) and the American Health Foundation. The NCI collection, known at the Registry of Experimental Cancers/World Health Organization Collaborating Center for Tumors of Laboratory Animals, is one of the largest resources of its type in the world, with tissue specimens dating back to 1937. The computerized registry has about 60,000 tissue specimens, including paraffin blocks of tissues, mostly from tumors in rodents (including guinea pigs) with a few specimens from chickens, frogs, marsupials, monkeys, rabbits, and fish. Scientists may examine the collection of autopsy records, histologic slides, lantern slides, and micrographs at the center. The American Health Foundation in Valhalla, New York, houses a collection of over 40,000 carcinogen-induced tumor samples from laboratory animals, mostly rats, mice, and hamsters. Many of the respiratory tract tumors have resulted from exposure to chemicals in cigarette smoke. Some other tumors have been induced by exposure to nitrosamines.

FOR ADDITIONAL INFORMATION: Contact: Mr. Ed Post, National Institutes of Health, Research Resources Information Center, 1776 East Jefferson Street, Rockville, Maryland 20852; (301) 881-4150.

0844 Automated Plankton Sorting System

Department of Commerce, Washington, DC.

Jan 84 *(E)*

A prototype automated image analysis system has been developed to rapidly obtain a count and size frequency distribution of at least 10 major taxonomic groups of icthyoplankton and zooplankton. The system uses silhouette photography to obtain high contrast images, digital processing and standard pattern recognition techniques for parameter extraction. Traditionally, labor intensive efforts are required to obtain this type of data. Conceptually, this system can be used for any repetitive, sorting, counting, and measuring tasks for objects whose size is of the order of a millimeter plus or minus two orders of magnitude. Inquiries have been received about its use for analysis of fish scales, otoliths, plant seeds, ocean bubbles, volcanic ash particles, and deep sea sediments.

FOR ADDITIONAL INFORMATION: Contact: NOAA Office of Research and Technology Applications, Mail Stop (D), FB4, Room 3308, Suitland, MD 20233; (301) 763-2419.

Bacteria Count Photometer is Developed
See 0999

0845 Biochemical Markers Useful in Preventing Cancer and Cardiovascular Disease Developed

Department of Health and Human Services, Washington, DC.

Oct 84 *(E, J)*

Cancer and cardiovascular diseases--including heart attacks and strokes--are the major causes of death and disability today. In both types of disorders, researchers note that biochemical abnormalities exist long before the onset of symptoms of the disease. Two tests have been developed that aid in the diagnosis of cardiovascular disease and cancer. The test for cardiovascular disease involves determining lipoproteins (complex molecules that transport fat in the blood) by high-resolution electrophoresis. The test for cancer involves separating serum proteins by the same high-resolution electrophoresis, and identifying them by another variation of electrophoresis, called immunofixation. Some circulating lipoproteins have been associated with the development of cardiovascular disease. The test demonstrates the presence of all lipoproteins as they circulate in a normal state in the blood. In addition, this test detects two beta lipoproteins that identify patients with type-3 hyperlipoproteinemia as compared to the single beta lipoprotein band found in normal persons. Patients with this condition develop angina and heart attacks early in life. Along with screening potential heart attack victims, this laboratory test also demonstrates an extra (pre-beta) lipoprotein fraction found in the serum of a majority of patients with cardiovascular disease and only in a small number of normal individuals. Also developed was a high-resolution agarose gel electrophoresis test for detecting abnormalities of serum proteins which can be used as biochemical markers for cancer. These inexpensive and non-invasive laboratory tests are significant because they will enable the physician to diagnose a disorder early and prescribe appropriate therapy to minimize or eliminate the threat of disease.

FOR ADDITIONAL INFORMATION: Contact: Dr. Papadopoulos, Building 10, Room 2C433, NIH, Bethesda, MD 20205; (301) 496-1924.

0846 Biofeedback-Mediated Behavioral Treatment of Airsickness

Department of the Air Force, Washington, DC.

Jan 84 *(E)*

The USAF School of Aerospace Medicine has developed a behavioral treatment procedure using biofeedback which teaches the patient to minimize or eliminate symptoms by using self-regulation. The success rate has been 70 percent. This procedure has been demonstrated, and is both repeatable and effective. The method is applicable to those who have chronic airsickness either as a passenger or aircrew member. It should be administered by mental health professionals who are familiar with and skilled in the more conventional biofeedback treatment protocols and who are also intimately familiar with the flying environment.

FOR ADDITIONAL INFORMATION: Publications related to this treatment include: Biofeedback Rehabilitation of Airsick Crew, Aviation Space and Environmental Medicine, pp. 118-121, Vol. 52, 1981. Contact: Col. David R. Jones, USAF School of Aerospace Medicine/NGN, Brooks AFB, TX; (512) 536-3537.

0847 Biotechnology Resources Directory Revised

Department of Health and Human Services, Washington, DC.

Sep 84 *(E, K)*

The fifth revised edition of the Biotechnology Resources, A Research Resources Directory is now available free. Describing the biotechnology resources of the NIH Division of Research Resources (DRR), the 84-page booklet identifies 43 current DRR grant facilities, many of which may be used by biomedical researchers. These resources provide the national biomedical community with new technologies and processes for the conduct of biomedical studies. Facilities supported by the Biotechnology Resources Program include large-scale and minicomputer systems; mass, nuclear magnetic resonance, and electron spin resonance spectrometers; lasers; flow cytometers; million-volt electron microscopes; X-ray absorption and diffraction instruments; biomedical engineering technologies; and production of biomedical and cellular materials.

FOR ADDITIONAL INFORMATION: Contact: Research Resources Information Center, 1601 Research Blvd., Rockville, MD 20850; (301) 984-2870.

0848 Bone Damage Linked To Long-Term Steroid Therapy

Department of Health and Human Services, Washington, DC.

Sep 84 *(E)*

Prolonged steroid therapy causes bone loss and frequent fractures of the ribs and vertebrae. In a study conducted at the National Jewish Hospital/National Asthma Center in Denver, researchers found that corticosteroids exert their deleterious effects primarily on spongy, trabecular bone, a finding that explains the preferential involvement of the ribs and vertebrae, since these structures are predominantly composed of spongy bone.

FOR ADDITIONAL INFORMATION: Contact: National Institutes of Health, Research Resources Information Center, 1601 Research Blvd., Rockville, MD 20850; (301) 984-2870.

Clinical Mass Spectrometers Are Now Available

See 0458

0849 Computer Model Has Been Developed To Assist Orthopedic Surgeons

Veterans Administration, Washington, DC.

May 84 *(E)*

Researchers have developed a computer model to simulate segments of the spine by finite element beams. Strength studies were performed on spinal segments taken from cadavers. A group of orthopedic surgeons and mechanical engineers used this information to create a computer model that can determine the effect surgical procedures have on a patient's spine. The model has already been used to predict the outcome of surgery to correct curvature of the spine. Surgery is used to correct spinal problems that cannot be solved through braces. This new computer model will allow surgeons to determine the optimum treatment to correct spinal problems. The model is still in testing stages, but it will eventually be available for use on personal computers. The model will include preoperative radiographs to evaluate the necessary treatment.

FOR ADDITIONAL INFORMATION: Contact: Dr. John Trimble, Hines VA Hospital, P.O. Box 20, Hines, IL 60141; (312) 343-7200.

0850 Computer Program Uses Fundamental Neuroanatomy as the Basis for Interpreting Patient Data

Department of Health and Human Services, Washington, DC.

Jul 84 *(E)*

To aid physicians in the location of peripheral nervous system lesions that may cause muscle weakness, researchers at the University of Pittsburgh School of Medicine have designed LOCALIZE, a computer program that uses fundamental neuroanatomy as the basis for interpreting patient data. With information obtained from clinical observations and use of the elctromyograph, an instrument that records muscle response to electrical stimulation of nerves, LOCALIZE can quickly identify the sites of single or multiple lesions that cause neurological abnormalities, even if the lesions are complex and unusual. Additional features of the program include the ability to explain its decisions, detect inaccurate patient data, and request additional information.

FOR ADDITIONAL INFORMATION: Contact: National Institutes of Health, Research Resources Information Center, 1776 East Jefferson Street, Rockville, MD 20852, (202) 881-4150.

0851 Computer Simulates Organogenesis

Department of Health and Human Services, Washington, DC.

Dec 84 *(A, E)*

Researchers have designed a computer program that duplicates the changing shapes of embryonic cells from which mature organs develop. The program is based on in vitro measurements of chick and mouse developmental cells and provides two-dimensional interpretations of microscopic views of tissue sections. The immediate goal of the computer program was to simulate the shapes of various organ primordia as a means of duplicating the structural changes of developing organs. The long-term objective of the study is to ascertain which early cellular changes are responsible for the formation of a typical organ shape.

FOR ADDITIONAL INFORMATION: Contact: Dr. Robert Hilter, Temple University, Philadelphia, PA; (215) 787-7000.

0852 Controlling Explosives With Microbes: A microorganism removes nitrate ester groups from grains

Army Materiel Development and Readiness Command, Alexandria, VA.

Mar 84 *(J)*

A report describes a study of microorganisms as a means of controlling the burning rate of explosives. The purpose of the micro-organisms is to remove energetic nitrate ester groups from the surface of explosive grains. The study found that the fungus Aspergillus fumigatus utilizes nitrogen from pyroxylin suspended in a nitrogen-deficient medium if a supplementary carbon source is provided. The study also established the rate of hydrolysis of the nitrocellulose nitrate ester group when suspended in an aqueous medium.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A117393, price code: A02, or contact project officer Bruce W. Brodman (201) 724-2852.

0853 Detecting Abnormal Cells by Fluorescence: Analysis by two matched stains is fast and accurate

Department of Energy, Washington, DC.

Sep 84 *(E)*

A new method of detecting abnormal cells in a cell culture permits cell assays to be performed in only about 3 h instead of several days as with previous methods. The new technique identifies cells that are deficient in some cellular material, such as enzymes, proteins, carbohydrates, lipides, or DNA. A histochemical stain is first applied to the cell culture. The stain is sensitive to the presence of the cellular material and therefore stains only the normal cells. A fluorescent stain is then applied to the cell culture, staining both the normal and abnormal cells. A proper choice of the fluorescent stain is imperative. Examples of histochemical stains that may be used include nitroblue tetrazolium, tetranitroblue tetrazolium, thiocarbamyl nitroblue tetrazolium, distyrl nitroblue, fast blue BB, fast blue BBN, fast red TR, and tetramethylbenzidine.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,345,027, which is available from: Commissioner of Patents, Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For further information, contact Frank A. Dolbeare, Biomedical Research Division, Lawrence Livermore National Laboratory, Livermore, CA 94550; (415) 422-5718.

0854 Detection of Carcinogenicity Based on Mutagenicity in Arabidopsis

Environmental Protection Agency, Washington, DC.

Apr 84 *(E)*

Thirty-seven synthetic chemicals plus two mycotoxins were tested for mutagenicity in an Arabidopsis embryo system. The results of this test, prokaryotic repair tests, bacterial mutation assays, eukaryotic cell systems and in vivo tests were compared to the carcinogenicity classifications of the chemicals. Thirty-two of the 37 chemicals tested were correctly identified as either mutagenic or nonmutagenic in the Arabidopsis assay. A higher percentage of carcinogens and presumed noncarcinogens were mutagenic to Arabidopsis than to the prokaryotic repair systems, bacterial mutation assays, eukaryotic tests, and in vivo tests. The Arabidopsis assay could be a valuable addition to a battery of short-term tests for identifying carcinogens.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB83-225078, price: $10. For other information, contact Shahbeg S. Sandhu, EPA Project Officer, Health Effects Research Laboratory, US EPA, Research Triangle Park, NC 27711.

0855 Drug for Skin Diseases is Successful for Treating Arthritis

Department of Health and Human Services, Washington, DC.

Jul 84 *(E)*

13-cis-retinoic acid, a drug recently developed to treat a variety of skin diseases and disorders, may also be useful in the treatment of arthritis. Using an animal model of arthritis, it was demonstrated that oral doses of 13-cis-retinoic acid markedly reduced joint inflammation associated with adjuvant arthritis. Researchers also studied the effect of 13-cis-retinoic acid on the production of collagenase and prostaglandin E2 (PGE2) by cells taken from the inflamed joints rats and placed in tissue culture. They found that cells from rats with adjuvant arthritis treated with the drug had decreased levels of collagenase compared to cells from placebo-treated rats with adjuvant arthritis.

FOR ADDITIONAL INFORMATION: Contact: National Institute of Arthritis, Diabetes, and Digestive and Kidney Diseases, Building 31, Room 9A04, 9000 Rockville Pike, Bethesda, MD 20205.

0856 Feasibility of Applying Genetic Engineering Technology to Aquatic Plant Control is Studied

Department of the Army, Washington, DC.

Dec 84 *(E)*

Eurasian watermilfoil and hydrilla are two noxious submersed aquatic plants that interface with drainage, irrigation, boat traffic, and recreational use of waterways. The conventional approach for finding biocontrol agents for such nuisance species has been to conduct searches for natural enemies in the country of origin. Such overseas and domestic searches will continue, but many years will be required to develop any agents found. Application of genetic engineering technology is another possible approach. Genetic engineering has produced microorganisms, some of which are now commercially available, to address problems in such diverse areas as production of insulin and other pharmaceuticals, treatment of oil spills, and control of agricultural pests. Application of genetic engineering technology to the development of a biocontrol agent for Eurasian watermilfoil and hydrilla is feasible. The technology is sufficiently advanced to initiate such an effort as soon as host-specific microorganisms can be found.

FOR ADDITIONAL INFORMATION: Contact: Environmental Laboratory, Attn: J.L. Decell. U.S. Army Engineer Waterways Experimental Station, P.O. Box 631, Vicksburg, MS 39180; (601) 634-3494.

0857 First Artificial Chromosome Constructed: Promises New Insight into Birth Defects

Department of Health and Human Services, Washington, DC.

Sep 84 *(E)*

A team of Harvard medical professors have devised an artificial chromosome that should enable scientists to learn more about how natural chromosomes go awry in such birth defects as Down syndrome. With support from the National Institute of General Medical Sciences (NIGMS), this first artificial chromosome was constructed from fragments of yeast and other genetic material and have shown that it performs many of the functions of a normal yeast chromosome. Researchers seeking to understand how chromosomes work, until recently, could only do this by studying naturally occurring chromosomes. Now, by using recombinant DNA techniques, scientists can construct and analyze the action of various chromosomal combinations.

FOR ADDITIONAL INFORMATION: Contact: National Institute of General Medical Sciences, Building 31, Room 4A52, 9000 Rockville Pike, Bethesda, MD 20205; (301) 496-7301.

0858 Flexible Method for Analyzing Bird Band Recovery Data

Department of the Interior, Washington, DC.
Jan 84 *(A, E)*

For several years a number of statistical procedures have been available for estimating survival and recovery rates from band recoveries. While these procedures have proven to be very effective, they encompass only a portion of the biologically reasonable models which may be used to describe band recovery data. A flexible computing algorithm has been developed which allows a biologist with limited computer programming abilities to specify his own model and to estimate the parameters from that model. Models which have been incorporated into this algorithm include: (1) Survival rates hypothesized to be a linear function of recovery rates, (2) survival rates hypothesized to be a linear function of a covariate (for example, temperature), (3) estimation of interval survival rates from banding at 2 times of the year, (4) estimation of reporting, harvest, and survival rates from recoveries of reward-banded and standard-banded birds. The program has been written in HP-FORTRAN language and can be used in either batch or interactive mode.

FOR ADDITIONAL INFORMATION: Contact: Director, U.S. Fish and Wildlife Service, Patuxent Wildlife Research Center, Laurel, Maryland 20708; (301) 776-4880.

Flowthrough Bacteria-Detection System: An online system allows repetitive cycling of sample intake, bacteria counting, and sterilization
See 0484

0859 Food Irradiation Expertise is Developed

Department of Energy, Washington, DC.
Nov 84 *(E)*

The Materials Department of the Pacific Northwest Laboratory (PNL) has developed an expertise in food irradiation. As part of ongoing efforts in the development of uses for nuclear byproducts, studies have been carried out on the practicality of irradiation as a food preservation technique. Some areas of research include the elimination of pork trichinosis, citrus medfly, apple codling moth, and potato sprouting. The use of Cesium 137 and Cobalt 60 has been emphasized.

FOR ADDITIONAL INFORMATION: Contact: Garth L. Tingey, Battelle Pacific Northwest Laboratory, Materials Department, P.O. Box 999, Richland, WA 99352, (509) 375-2419.

0860 Further Developments Made in Artificial Skin

Department of Health and Human Services, Washington, DC.
Dec 84 *(E)*

Burn injury is the third leading cause of accidental death in the United States. To help reduce this toll, speed recovery, and lessen disability and disfigurement, the National Institute of General Medical Sciences (NIGMS) supports research which aims to improve our understanding of the fundamental physiological mechanisms underlying the complications of burn injury. An artificial skin was developed by NIGMS-supported scientists Dr. Ionnis Yannas of the Massachusetts Institute of Technology in Cambridge and Dr. John Burke of Massachusetts General Hospital in Boston. The artificial skin promises to avoid many problems. The skin, which is composed of interlaced fibers constructed from cowhide collagen (a major protein of connective tissue) and shark cartilage was found to be a good wound covering. It does not cause infection, inflammation, or rejection, and it cuts healing time significantly.

FOR ADDITIONAL INFORMATION: Contact: National Institute of General Medical Sciences, Building 31, Room 4A52, 900 Rockville Pike, Rockville, MD 20205; (301) 496-7301.

0861 Gamma Rays Kill Moth Larvae on Fruit

Department of Agriculture, Washington, DC.
Jan 84 *(E)*

Codling moths are serious pests of apples and pears in this country and that spells trouble in trying to export these fruits to Japan. A problem is that a fumigant, methyl bromide, successful in killing codling moths infesting cherries and acceptable to Japan, doesn't work on apples and pears. Now irradiation has been used successfully to kill codling moth larvae. Agricultural Research Service scientists, who developed the fumigation treatment for cherries, hope that radiation may be a suitable substitute for fumigation.

FOR ADDITIONAL INFORMATION: Contact: Harold R. Moffitt and Arthur K. Burditt, Yakima Agricultural Research Laboratory, Agricultural Research Service, USDA, Yakima, WA 98902, (509) 575-5974.

0862 Gene Cloning May Sprout Super Seeds

Department of Agriculture, Washington, DC.
Jan 84 *(E)*

Why some seeds sprout while others do not is a riddle. Agricultural Research Service scientists say recombinant-DNA technology may find an answer in certain genes that act as a signal for seeds to germinate. They are pursuing implications of earlier findings that germination of barley, rice and wheat seeds is triggered by a hormone called gibberellic acid (GA), produced by the embryo inside the seed. GA signals aleurone cells beneath the seed coat to produce many enzymes including digest starches stored in the seed and convert them to simple sugars and acids that nourish the embryo so the seed can germinate and grow roots. If scientists can clone the genes that respond to the GA signal to produce the digestive enzymes, they may be able to produce super seeds that have increased vigor and ability to germinate and grow uniformly.

FOR ADDITIONAL INFORMATION: Contact: G. Ram Chandra, Seed Research Laboratory, Agricultural Research Service, USDA, Beltsville, MD 20705; (301) 344-3466.

Guidelines for Monitoring Indoor Air Quality
See 0403

High-Yield Alcohol Fermentation Process: Vacuum fermentation combined with vacuum distillation reduces energy needs
See 0102

0863 Hybridoma Data Bank Available

Department of Health and Human Services, Washington, DC.
Nov 84 *(E)*

A comprehensive data bank on the rapidly expanding field of hybridoma technology is available. The Hybridoma Data Bank (HDB) promises to expedite information exchange on hybridomas and other cloned cell lines producing immunoreactive substances. The HDB will serve as a source for locating hybridomas of given specificity and a means for maintaining background information on the hybridomas for comparative studies of methods and species used in their production.

FOR ADDITIONAL INFORMATION: Contact: Lois Blaine, Hybridoma Data Bank, 12301 Parklawn Drive, Rockville, MD 20852; (301) 881-2600.

Instrument is Developed to Measure Lead in Human Tibia
See 0500

0864 Investigators Work to Reduce Effects of Traumatic Eye Injuries

Department of Health and Human Services, Washington, DC.
Sep 84 *(E)*

Currently the National Eye Institute (NEI) is supporting studies directed at improving the treatment of alkali burns of the cornea. These burns, which are among the most sight-threatening of all corneal injuries, occur in industrial and agricultural workers who handle phosphates, anhydrous ammonia, and other strongly alkaline chemicals. In these corneal injuries caused by alkaline chemicals, there is a high risk that the alkali burn will trigger the release of enzymes that break down collagen. In an effort to develop methods of preventing this disastrous corneal break-down in alkali burn patients, a series of laboratory studies testing two mild organic acids--ascorbic acid (vitamin C) and citric acid--were studied as treatments for alkali burns of the cornea. The results of his studies with rabbits were so promising that an NEI-supported clinical trial was begun to test the treatments in patients. NEI investigators also have shed some light on the mechanisms responsible for sympathetic ophthalmia, a rare and little-understood disorder that has long been one of the most dreaded complications of ocular trauma.

FOR ADDITIONAL INFORMATION: Fact sheets and brochures on several common eye disorders are available from NEI's Office of Scientific Reporting. National Eye Institute, Building 31, Room 6A25, 9000 Rockville Pike, Bethesda, MD 20205; (301) 496-5248.

Jamming Courtship Signals with Scent Molecules May Curb Insect Pest
See 0026

0865 Lead(203)-Tris-hydroxymethyl Aminomethane: A Radiopharmaceutical For Detection and Localization of Tumors

Department of Energy, Washington, DC.
Feb 84 *(E)*

Lead-203 is a radioactive nuclide that has excellent physical characteristics appropriate for tumor scanning. The tissue penetration of its photon radiation is sufficient for localization of deep seated tumors, specifically posteriorly located choroidal melanoma. The successful use of 203Pb would obviate the necessity for invasive techniques of localization required with the frequently used phosphorus-32. 203-Pb-tris has a high uptake by tumor and low uptake by the retina, which implies that there would be little background interference. The low uptake by the lens would indicate the safety of the radiopharmaceutical with regard to the induction of a radiation cataract. A protocol was developed for the preparation of sterile and pyrogen free 203-Pb-tris such that it can be evaluated in humans as a radiopharmaceutical.

FOR ADDITIONAL INFORMATION: Contact: W. Marcuse, Office of Research and Technology Assessment, Brookhaven National Laboratory, Upton, Long Island, New York 11973; (516) 282-2103. Patent 4,011,307 has been granted and licensing inquiries are welcome.

Linear Position-Sensitive X-Ray System
See 0508

0866 Liquid Pathway Dose Calculations (LADTAP2)

Department of Energy, Washington, DC.
Nov 84 *(A, E)*

The computer program LADTAP2 determines the radiation dose to man from the pathways in the aquatic environment - potable water, aquatic foods, shoreline deposits, swimming, boating, and irrigated foods. Doses for both the maximum individual and the general population are calculated as a function of age group and pathway for appropriate body organs. Calculation of doses to certain species of biota other than man, such as fish, invertebrates, algae, muskrat, raccoon, heron, and duck.

FOR ADDITIONAL INFORMATION: Contact: NTIS Computer Products Center, National Technical Information Service, Springfield, VA 22161; (703) 487-4763. Refer to DE83-048992/TN.

0867 Live, Recombinant Virus Vaccine May Play Key Role in Disease Prevention

Department of Health and Human Services, Washington, DC.
Aug 84 *(E)*

Adapting modern techniques of genetic engineering, the National Institute of Allergy and Infectious Diseases (NIAID) is constructing new kinds of recombinant live virus vaccines, made by inserting bits of genetic material from other disease-causing agents into the vaccinia virus. The resulting hybrids retain the vaccinia virus's ability to produce local infection when inoculated in the skin of a wide variety of hosts, thereby stimulating their immune systems. It was shown that the vaccinia virus can accommodate large amounts of foreign genetic material, opening up the possibility that one recombinant live virus vaccine may be able to protect against several diseases at one time.

FOR ADDITIONAL INFORMATION: Contact: NAID, Building 31, Room 7A32, 9000 Rockville Pike, Bethesda, MD 20205; (301) 496-5717.

Longwall Coal Mine Respirable Dust Sources
See 0407

Making Food From Sawdust
See 0027

0868 Method of Continuous Production of Retroviruses (HTL V-III) from Patients with AIDS and pre-AIDS

Department of Health and Human Services, Washington, DC.
Jun 84 *(E)*

A cell system is disclosed for the reproducible detection and isolation of human T-lymphotropic retroviruses (HTLV-family) with cytopathic effects (HTLV-III) from patients with acquired immune deficiency syndrome (AIDS), pre-AIDS and in healthy carriers. One neoplastic aneuploid T-cell line derived from an adult with lymphoid leukemia, and termed HT, was susceptible to infection with the new variants of HTLV, which are transformed and providing T-cell populations which are highly susceptible and permissive for HTLV-III, and convenience for large scale production, isolation, and biological detection of the virus.

FOR ADDITIONAL INFORMATION: This technique is available for licensing. Please contact Mr. George Kudravetz or a staff member of the Office of Federal Patent Licensing for additional information. Refer to; PAT-APPL-6,602,946. Office of Federal Patent Licensing, National Technical Information Service, Room 9R, Springfield, Va. 22161.

Microwave Spectrometer Developed
See 0057

0869 Multiple-Compartment Dosimeter: Radiation dose is measured at various depths
Department of Energy, Washington, DC.
Nov 84 *(E, K)*

A molded-plastic dosimeter holder has compartments for a number of phosphors to register the radiation dose to the wearer's sensitive skin layers as well as the dose received in deeper layers from the more-penetrating radiation. The holder is made from one of several thermoplastics that simulate the radiation attenuation of human skin and flesh.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,346,511 which is available from: Commissioner of Patents, Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For further information, contact: DeRay Parker, EG & G Idaho, P.O. Box 1625, CF-690, Idaho Falls, ID 83415; (208) 526-2336.

0870 National Tritium Labeling Facility
Department of Health and Human Services, Washington, DC.
May 84 *(E, J)*

The facility provides researchers with large quantities of high-grade tritium and tritium-labeled compounds. The facility, supported by the Department of Energy and recently upgraded and expanded with funds from the Biotechnology Resources Program of the NIH Division of Research Resources, is designed for use by researchers working with tritium. Resource staff members instruct visiting investigators in how to incorporate the provided tritium into complex biological compounds, how to purify labeled compounds to a degree suitable for research in their own laboratories, and how to handle these labeled substances safely. The laboratory stores both tritiated water and pure tritium with a specific activity of about 50 curies per millimole.

FOR ADDITIONAL INFORMATION: Contact: Dr. Henry Rapoport, Lawrence Berkeley Laboratory, University of California, Building 3, Berkeley, California 94720; (415) 486-4325.

0871 New Chemical Markers of Septic Arthritis Have Been Identified in Bone-Joint Fluids
Department of Health and Human Services, Washington, DC.
Nov 84 *(E)*

The markers--acetic acid and 3-methyl butanoic acid, which are both short-chain fatty acids--correlated with the presence of staphylococcal infections. The markers may assist physicians in early diagnosis of septic arthritis. Therapy must be applied as soon as possible to halt the progression of this disease. A characteristic pattern of acetic and 3-methyl butanoic acids was detected in three of eight patients with Staphylococcus aureus as the infectious agent.

FOR ADDITIONAL INFORMATION: Contact: Research Resources Information Center, 1601 Research Blvd., Rockville, MD 20850; (301) 984-2870.

A New Class of Chemical Labels Has Been Developed
See 0118

0872 New Findings On the Metabolism of Copper Are Released
Department of Agriculture, Washington, DC.
Apr 84 *(E)*

New findings on the effects of certain chemicals on metabolism of copper point to the importance of adequate amounts of this trace mineral in the diet. The research may yield clues to a secret for maintaining a healthy heart and cardiovascular system. Research is leading to understanding of the physiological effects of some of these, such as phytic acid, calcium and ascorbic acid. Studies at the ARS Grand Forks Human Nutrition Research Center on a class of chemicals called cholesterotropic and cuprotropic may put researchers one step closer to understanding how coronary heart disease develops. The latest study was on the drug clofibrate, which doctors often use to lower cholesterol concentrations in the blood plasma of humans in hope of reducing the risk of heart attacks.

FOR ADDITIONAL INFORMATION: Contact: Dr. Leslie M. Klevay, Agricultural Research Service, North Central Region, 2000 W. Pioneer Parkway, Peoria, IL 61615; (701) 775-8353.

New Liquid Compound Separation Technique Developed
See 0119

0873 New Standard Antibody Sera Are Now Available From CDC
Department of Health and Human Services, Washington, DC.
Mar 84 *(E)*

Five standard antinuclear antibody sera recently developed by the Arthritis Foundation and the Centers for Disease Control (CDC) are available free to physicians nationwide. The sera are used to help diagnose a special group of diseases, including systemic lupus erythematosus (SLE) and Sjogren's syndrome, that cause parts of the body's immune system to attack cell nuclei. The center has at least 2,500 ampules of each serum standard. The sera contain antibodies from patients with autoimmune diseases that included SLE, mixed connective tissue disease, and Sjogren's syndrome.

FOR ADDITIONAL INFORMATION: Contact: Ms. Susan Kennedy, ANA Reference Laboratory, Immunology Branch 1-1202, Centers for Disease Control, Atlanta, Georgia 30333; (404) 329-3922.

0874 New System For Administering Chemotherapy Is Developed
Department of Health and Human Services, Washington, DC.
May 84 *(E)*

In a test conducted on a totally implantable system at the General Clinical Research Center (GCRC) at the University of Michigan Medical School in Ann Arbor, all classes of cancer chemotherapeutic agents as well as antibiotics; whole blood, packed red blood cells, platelets, and plasma were administered through the system. There were no infections, no significant local irritation, and the system has remained functional for as long as three years. In pump and port-catheter systems, the drug is injected through a self-sealing rubber septum. The subcutaneous port-catheter system was also used successfully for intra-arterial chemotherapy in 19 patients with solid tumors. The implanted port-catheter system will probably be used for a variety of medical applications other than cancer chemotherapy. It can be used for the chronic infusion of medication with the aid of an external pump. The system will offer advantages in the treatment of diabetes mellitus, hematological disorders, chronic intestinal diseases requiring intravenous hyperalimentation, and intraperitoneal dialysis for patients with chronic renal failure.

FOR ADDITIONAL INFORMATION: Contact: Mr. Ed Post, National Institutes of Health, Research Resources Information Center, 1776 East Jefferson Street, Rockville, Maryland 20852; (301)881-4150.

0875 New Tests for Gaucher's Disease Predict Nervous System Involvement

Department of Health and Human Services, Washington, DC.

Feb 84 *(E)*

National Institute of Neurological and Communicative Disorders and Stroke (NINCDS) scientists have developed two new diagnostic tests that can predict whether a child with Gaucher's disease will eventually show nervous system involvement. Gaucher's is an inherited lipid storage disorder and is characterized by an abnormal buildup in tissues of glucocerebroside--a complex fat or lipid. Glucocerebroside accumulates because of a genetically determined defect in an enzyme called glucocerebrosidase, that normally breaks down the lipid. The tests will help scientists plan a course of treatment and provide precise genetic counseling for Gaucher's patients.

FOR ADDITIONAL INFORMATION: Contact: National Institute of Neurological and Communicative Disorders and Strokes, National Institutes of Health, Building 31, Room 8A03, 9000 Rockville Pike, Bethesda, MD 20205; (301) 496-5924.

0876 NIAID Researchers Create Potential Live, Recombinant Virus Vaccine

Department of Health and Human Services, Washington, DC.

Feb 84 *(E)*

Scientists at the National Institute of Allergy and Infectious Diseases (NIAID) have combined vaccinia virus, used to immunize against smallpox, with genetic material from hepatitis B virus to produce what may be the first of a new generation of live, recombinant vaccines. The hybrid vaccinia virus contains the gene for hepatitis B surface antigen and stimulates protective antibodies against hepatitis when injected into animals. NIAID researchers have identified sites on the vaccinia virus genome at which foreign DNA can be inserted without the virus losing infectivity. A way was also devised to introduce foreign DNA into the virus so that the protein encoded by the new DNA is produced along with normal vaccinia protein during the growth cycle of the virus. The investigators anticipate that this technique could be used to insert genes for antigens of various disease-causing agents and to make a number of different live vaccines.

FOR ADDITIONAL INFORMATION: Contact: National Institute of Allergy and Infectious Diseases, National Institutes of Health, Building 31, Room 7A32, 9000 Rockville Pike, Bethesda, MD 20205; (301) 496-5717.

0877 NICHD-Supported Scientists Design Test for Prenatal Diagnosis of PKU

Department of Health and Human Services, Washington, DC.

Feb 84 *(E)*

Using genetic engineering techniques, scientists have succeeded in developing a procedure to diagnose phenylketonuria (PKU) in unborn children as well as in healthy older siblings who may be carriers of the trait. With the help of recombinat DNA techniques,, the gene was cloned for the human liver enzyme (phenylalanine hydroxylase) that - if absent or deficient - causes PKU. This cloned gene was then used in testing fetal cells obtained from the amniotic fluid of pregnant women. The major benefit of the research is that, in families that already have one or more children with PKU, the new test enables the physician to accurately determine whether the fetus of a subsequent pregnancy is affected by the disorder.

FOR ADDITIONAL INFORMATION: Contact: National Institute of Child Health and Human Development, National Institutes of Health, Building 31, Room 2A32, 9000 Rockville Pike, Bethesda, MD 20205; (301) 496-5133.

Non-linear Regression Program Developed
See 0211

Non-Linear Regression Program Fits Data to Non-Linear Models: Personal Microcomputers Used
See 0212

0878 Occupational Health Information System Developed

Department of the Navy, Washington, DC.

Jul 84 *(E)*

The objective of the Navy Occupational Health Information Monitoring System (NOHIMS) is to provide an information system that will coordinate the components of the Navy's occupational health program. In the overall design of NOHIMS, the personnel data and environmental data have been subsumed under the more general label of industrial data. This structure assures the security of the medical data while allowing medical personnel access to needed environmental information. The key features of the NOHIMS design that make it attractive for implementing an occupational health information system are its extensive flexibility and adaptability; its 'user friendly' nature; its transferability from one Navy Industrial facility to another; its applicability to small, large, or very large industrial settings; and its ability to link occupational health data from a variety of sources in a network of separate, distributed databases.

FOR ADDITIONAL INFORMATION: Contact: Dr. Dennis P. Nelson, Naval Health Research Center, P.O. Box 85122, Code 30, San Diego, CA 92138; (714) 255-2061.

0879 Occupational-Safety Workshops: Safety-management-control programs are offered

Department of Energy, Washington, DC.

Nov 84 *(D, E)*

Several workshops and seminars are available on various aspects of occupational risk, including management troubleshooting, safety-risk analysis, accident investigations, audits and appraisals, and operational readiness assurance. The program is designed for general and safety managers, safety support staff, engineers and scientists, technicians, systems analysts, and quality assurance personnel.

FOR ADDITIONAL INFORMATION: Contact: Peg Schneider, EG & G Idaho, P.O. Box 1625, Idaho Falls, ID 83415.

Optical-Fiber Dosimeter: Portion of red-to-blue light spectrum transmitted indicates radiation dose
See 0543

0880 Parasite Specimens Available

Department of Health and Human Services, Washington, DC.

Jul 84 *(E)*

Parasite specimens from around the world are available for loan from the U.S. National Parasite Collection in Beltsville, Maryland. The collection's 80,000 samples, ranging from parasites isolated from fish and wildlife to causative agents of animal and human diseases, make it one of the largest such respositories in the world. The repository has two parts: the USDA parasite collection, which dates back to 1892, and the U.S. National Museum Helminthological Collection, begun two years later. Both specialize in worm parasites--flatworms, like the intestinal tapeworm of humans, and roundworms, such as nematodes. Other types of parasites include protozoans, arthropods, pentastomids, leeches, ticks, and mites. Specimens are preserved in bottles of ethyl alcohol and on slides.

FOR ADDITIONAL INFORMATION: Contact: Dr. J. Ralph Lichtenfels, Animal Parasitology Institute, U.S. Department of Agriculture, Beltsville Agricultural Research Center--East, Beltsville, MD 20705; (301) 344-2201.

0881 Portable Dental Chair Functions as a Total Care Unit

Department of the Navy, Washington, DC.

Oct 84 *(E)*

The Naval Dental Research Institute (NDRI) has developed a portable dental chair that is compact, lightweight, simply designed, and yet durable to withstand the rigors of transport and use in all environments. The NDRI portable dental delivery system consists of three subsystems: a chair, a dental care delivery unit, and a light. No tools are required for assembly; all components are clamped into position with knobs or thumbscrews. The total system is packaged into one durable weatherproof container weighing 210 lb.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, VA 22448. Refer to 090701/TN.

Procedures For Airborne Sensors Are Developed
See 0551

0882 Prodrugs Based on Phospholipid-Nucleoside Conjugates: New substances last longer in the body and are more effective

Department of Energy, Washington, DC.

Sep 84 *(E)*

New 'prodrugs' that are derivatives of arabinonucleosides appear to be more effective in preliminary studies than the parent arabinonucleosides in treating certain types of cancer in test animals. In effect, the parent drug is packaged for delivery to the affected cells by attaching it to nontoxic carrier molecules that protect the drug from degradation by enzymes. The drug is subsequently released by chemical or enzymatic action in the cells. The new class of prodrugs is derived from 1-beta-D-arabinofuranosylcytosine (araC) as phospholipid-drug conjugates.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PAT-APPL-6,345,442, price code: A02. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

0883 Removing Biostatic Agents From Fermentation Solutions: Liquid carbon dioxide is an inexpensive solvent

National Aeronautics and Space Administration, Washington, DC.

Nov 84 *(D, E)*

An inexpensive process has been proposed for removing such poisons as furfural and related compounds from the fermentation baths of biomass hydrolysates. The new process is based on the use of liquid carbon dioxide as an extraction solvent. Liquid CO2 is preferable to such other liquid solvents as ether or methylene chloride. These substances are expensive and are bacteriostatic in themselves so that they must be removed from the sugar solution before it can ferment. In the new process, liquefied CO2 is introduced into a water solution of the sugars and furfural at room temperature and a pressure of 850 lb/sq in. A well-designed system would be likely to generate enough CO2 to make up for process losses, so that the extraction method could be highly economical.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15806/TN.

0884 Researchers Produce a Tumor Localizing Agent

Department of Energy, Washington, DC.

Dec 84 *(E)*

A complex of transferrin with radioactive Ruthenium (Ru-103, Ru-97) has been produced and tested in laboratory animals. The tumor uptake 24 to 72 hours after injection is quite high yielding effective diagnosis by external imaging, and also of abscessed or inflamed tissue. The complex provides effective localization of the tumors and identifies their extent in animal models. Ru-103 and Ru-106, beta-emitting nuclides of Ruthenium could have potential application as therapeutic radiopharmaceuticals. Ruthenium-97 has been produced by using the Brookhaven Linac Isotope Producer at Brookhaven National Laboratory. It can be produced in meaningful quantities at other places with an appropriate facility. Economical production requires access to a high energy cyclotron or linear accelerator. A convenient procedure for labeling transferrin with Ru-97 or Ru-103 (or other ruthenium nuclides) has been developed at BNL. This can be carried out by any laboratory with routine facilities for radiopharmaceutical synthesis. Data in animals have demonstrated the usefulness of Ru-97 transferrin for tumor localization by scintigraphic procedures and a comparison based on several criteria indicates a figure of merit for Ru-97 transferrin about 5 times higher than that for Ga-67 citrate. Scintigraphic localization of tumors, abscesses and inflammatory tissue is one of many applications. Other include possible radiotherapy of tumors, better imaging than Ga-67 citrate, particularly for tumors in the abdominal area due to greatly reduced uptake in the liver and the gastrointestinal tract. Other advantages are that kinetics of uptake into abscesses and inflammatory tissue are faster than those of Ga-67 citrate, and it may also be useful for the study of wound healing, particularly for skin wounds.

FOR ADDITIONAL INFORMATION: Contact: W. Marcuse, Office of Research and Technology Assessment, Brookhaven National Laboratory, Upton, Long Island, New York 11973; (516) 282-2103.

0885 Serological Detection of Antibodies to HTLV-III in Sera of Patients with AIDS and pre-AIDS Conditions
Department of Health and Human Services, Washington, DC.
Jun 84 *(E)*

A new invention from the National Institutes of Health relates to the detection of antibodies in sera of acquired immune deficiency syndrome (AIDS) and pre-AIDS patients and describes the biochemical and immunological analysis of antigens associated with the virus HTLV-III. It shown that antigens associated with the infection of human cells by this virus are recognized by antibodies from AIDS patients. Specifically, HTLV-III isolated from AIDS patients and transformed by cocultivation with an HT cell line is detected by antibodies from human sera taken from AIDS patients. The method of detection of antibodies is a strip radioimmunoassay (RIA) based on the Western Blot technique or ELISA (an enzyme-linked immunosorbent assay) or indirect immunofluorescence assay.

FOR ADDITIONAL INFORMATION: This technique is available for licensing. Please contact Mr. George Kudravetz or a staff member of the Office of Federal Patent Licensing for additional information. Refer to; PAT-APPL-6,602,945. Office of Federal Patent Licensing, National Technical Information Service, Room 9R, Springfield, Va. 22161.

Serum or Plasma Specimens from Transfusion-Transmitted Viruses Study are Available
See 0064

Sharp-Focus Composite Microscope Imaging by Computer: Enhanced depth of focus aids medical analysis
See 0561

0886 Sickle Cell Anemia: New Approaches To Therapy
Department of Health and Human Services, Washington, DC.
Apr 84 *(E)*

Patients with sickle cell anemia experience unpredictable episodes of severe, sometimes disabling pain in the joints, abdomen, or spine, episodes that may last from a few days to several weeks. In an attempt to improve the quality of life for these patients, researchers at Beth Israel Hospital, in collaboration with researchers at Brigham and Women's Hospital in Boston, have designed three techniques to reduce the sickling of red blood cells, which causes painful crises associated with the disease. The three therapies are designed to minimize the polymerization of hemoglobin molecules in the red blood cells (RBC's) to form filaments that twist the RBC's into a sickle shape. Two of the new therapies cause RBC's to increase in volume, thereby reducing contact between hemoglobin molecules inside the cells. The third therapy, also tested only in vitro, increases hemoglobin's affinity for oxygen, which reduces the bonding of hemoglobin molecules to each other.

FOR ADDITIONAL INFORMATION: Contact: Mr. Ed Post, National Institutes of Health, Research Resources Information Center, 1776 East Jefferson Street, Rockville, MD 20852; (301) 881-4150.

0887 Simulating Mechanical Control Operations: A computer model can simulate mechanical harvesting operations using any specific mechanical system operated in any realistic environment
Department of the Army, Washington, DC.
Sep 84 *(A, D)*

The model, called HARVEST, has been tested and used experimentally for a number of years. The tests and experimental use showed that the model's simulations are realistic and that the model would be a good operations-planning tool. Mechanical harvesting of nuisance aquatic plants typically involves a number of stepwise or simultaneous operations. Rule-of-thumb estimates, which do not take into account important interactions between plant density, takeout point location, and mechanical performance parameters, may result in large errors in cost estimation. To keep track of all these simultaneous operations manually and attempt to predict harvesting system performance or how a change in one of the steps would affect system performance is a very easy task for HARVEST. Equipment parameters determine the speed at which plants are removed from the water, delivered to the shore takeout point, and deposited at a disposal site. Harvesting site geometry, distance between harvest site and shore takeout point, and distance between shore takeout point and upland disposal area determine the amount of time that must be spent transporting harvested plant material. HARVEST, written in FORTRAN IV, needs only 25K of memory to execute. The program can easily be placed on any personal computer that has enough memory to accommodate FORTRAN software. The program could be run in BASIC language.

FOR ADDITIONAL INFORMATION: Contact: Environmental Laboratory, ATTN: J.L. Decell, U.S. Army Engineer Waterways Experiment Station, P.O. Box 631, Vicksburg, Mississippi 39180, (601) 634-3494.

0888 Special Primate Specimens Are Now Available
Department of Health and Human Services, Washington, DC.
Aug 84 *(E)*

Researchers may learn additional detailed information about nonhuman primates from blood samples and other tissues from the seven Regional Primate Research Centers (PRCs) in the United States. All are supported by the Animal Resources Program of the National Institutes of Health Division of Research Resources. The Delta PRC in Covington, Louisiana, maintains one of the largest collections of South American monkeys in the United States. The center has tissue samples from more than 2,500 primates, including samples from primates other than South American monkeys, according to the PRC director Dr. Peter Gerone. Tissue specimens stored at the center include lesions caused by viruses and bacteria that naturally infect monkeys. Tissues at the Yerkes PRC, which include samples from the Atlanta center's unique collection of all the great apes, date back to 1966. Over 100,000 microslides are available for collaborative studies with center personnel, while blood, sera, and other tissue samples can be used for both independent and collaborative research.

FOR ADDITIONAL INFORMATION: Contact: Research Resources Information Center, 1601 Research Blvd., Rockville, MD 20850; (301) 984-2870.

0889 Spontaneous Changes in Chromosomes May Be First Detectable Event in The Onset of Tumorigenesis
Department of Health and Human Services, Washington, DC.
Aug 84 *(E)*

Changes in the number and structure of chromosomes may be one of the earliest detectable events in the spontaneous progression of cells toward the tumorigenic state, according to researchers at the Los Alamos National Laboratory in New Mexico. Studies indicate that the chromosomal change precedes the onset of tumorigenesis and the appearance of properties associated with transformed cells. Investigators at the laboratory say that the earliest stage of the spontaneous cancer process may result from a doubling in the number of chromosomes. Because cells with extra chromosomes are unstable, these cells retain only one or two of the extra chromosomes in addition to the normal number. Dr. L. Scott Cram, staff scientist and director of the National Flow Cytometry Resource, Dr. Paul Kraemer and their associates are using cultured Chinese hamster cells to characterize the initial events of tumor formation.

FOR ADDITIONAL INFORMATION: Contact: National Institutes of Health, Research Resources Information Center, 1601 Research Blvd., Rockville, MD 20850; (301) 984-2870.

Standards For Toxic Metals In Human Urine Are Developed
See 0133

0890 Studies Show Zinc Deficiency Retards Brain Development In Rats

Department of Agriculture, Washington, DC.
Mar 84 *(E)*

Scientists have determined that diets mildly deficient in zinc cause memory and learning impairments in the offspring of laboratory rats fed the diets during pregnancy and suckling periods. Impaired learning of the animals continued into adulthood. Results of the zinc-deficient diet study done at the Grand Forks, ND, Human Nutrition Research Center may have implications for humans. Researchers found that the hippocampus areas were less well developed in zinc-deficient rats with memory and learning impairments than they were in the rats on control diets. Research suggests it may be prudent for pregnant women to consume foods rick in zinc. If zinc deficiency occurs early in life during the critical period of brain development, normal growth and maturation may be irreversibly impaired.

FOR ADDITIONAL INFORMATION: Contact: Edward S. Halas, Agricultural Research Service, North Central Region, 2000 W. Pioneer Parkway, Peoria, IL 61615; (701) 775-8353.

Suitcase-Sized Portable Microbiology and Clinical Laboratories Developed
See 0566

Tiny Radiation Warning Devices: Miniature radiation warning device that enhances nuclear industry worker safety
See 0438

0891 Tissue Specimens Available for Pathology Studies

Department of Health and Human Services, Washington, DC.
Sep 84 *(E)*

Both the Armed Forces Institute of Pathology and the Johns Hopkins University lend numerous animal tissue specimens to pathologists nationwide. The Armed Forces Institute of Pathology (AFIP) in Washington, D.C., has study sets of human and animal tissues. One study set, for example, includes slides of tumors of the human ovary, cervix, and uterus and micrographs of specimens affected by various types of venereal disease. Other sets include such topics as pulmonary pathology, a variety of animal disorders, and general surgical techniques. Emphasis has been placed on accumulating materials of comparative interest and from animal models of human diseases. These include comparative ophthalmic lesions; common viral, bacterial, and fungal infections; spontaneously occurring neoplasms; and parasitic diseases. Giraffe tissue, malaria-infected penguins, and aged rhesus monkeys that model Alzheimer's disease are some of the animal specimens available to scientists through the Department of Pathology at the Johns Hopkins University. The university collection, which has tissue samples from more than 19,000 animals, includes contributions from the nearby Baltimore zoo and aquarium, in addition to specimens contributed by veterinarians across the country. Animal specimens in the archive include monkeys, baboons, dogs, birds, reptiles, cats, sheep, rabbits, and swine. About half of the paraffin-embedded tissue, histologic slides, and formalin-fixed tissue in the Hopkins collection are indexed on computer, which provides further details about the history of each animal.

FOR ADDITIONAL INFORMATION: Contact: Dr. John Strandberg, Department of Pathology, Johns Hopkins University, Baltimore, MD 21205; (301) 955-3334. Col. William Cowan, Armed Forces Institute of Pathology, Washington, D.C. 20306; (202) 576-2905.

Viewer Makes Radioactivity Visible: A battery-operated viewer could aid in contamination surveys and medical diagnoses
See 0585

Wristwatch Dosimeter: Besides telling the time, a device indicates radiation dosage and dosage rate
See 0587

NATURAL RESOURCES & EARTH SCIENCES

0892 Analysis of Short-Rotation Forests: Economic strategies are evaluated

Department of Energy, Washington, DC.
Oct 84 *(A, C, E)*

An analytical model has been developed for determining the most economical harvesting cycle for short-rotation forests, used for the production of woody biomass as a renewable resource of fuel, fiber, and chemical feedstocks. A short-rotation forest consists of a dense plantation of a single species of hardwood trees that has a fast initial growth rate and the ability to sprout repeatedly from the same stump. The model, which uses a complementarity algorithm for optimization, requires data on biomass-production costs, financial parameters, and the management system of the short-rotation forest as input.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-008717/NAB, price code: A04. For information not in the report, contact: Sinyan Shen, Argonne National Laboratory, 9700 South Cass Avenue, Argonne, IL 60439; (312) 972-6276. A copy of the program is available on magnetic tape.

0893 Aquifer Thermal-Energy Storage: A guide tells how to design and evaluate aquifer thermal-energy storage systems

Department of Energy, Washington, DC.
Mar 84 *(C)*

Guidelines have been prepared as a tool for those considering the use of aquifer thermal-energy storage (ATES). The guidelines are intended to assist in the conceptual design and evaluation of the technical and economic feasibility of systems employing ATES. The use of ATES can correct large-scale mis-matches between thermal-energy supply and demand. A pair or an array of wells is used with downhole pumps and aboveground heat exchangers and controls. Rules of thumb are provided for the early screening of potential ATES applications.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PNL-3581, price code: A11.

0894 Automated Coal-Mine Shuttle Car: A cable-guided car would increase efficiency in underground coal mines

National Aeronautics and Space Administration, Washington, DC.

Nov 84 *(F)*

An automated coal-carrying car would be guided by a cable stapled to the mine floor. Under the control of a computer, the car would run between the working face of a coal mine and a conveyor where it would be unloaded. The proposed unmanned vehicle would contain storage batteries in its side panels for driving traction motors located in the wheels. The batteries can be recharged during inactive periods or might be slid out as a unit and replaced by a fresh battery bank. An onboard generator could charge the batteries as the car operates.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15850/TN.

0895 Better Performance from Line and Check Curtains

Department of the Interior, Washington, DC.

May 84 *(D)*

A research objective was to improve the effectiveness of face ventilation systems in coal mines by minimizing leakage around line and check curtains. In-mine surveys were conducted to determine current curtain construction techniques, their effectiveness and associated costs. In addition, performance characteristics of extensible curtains were evaluated. Results of the study showed that the single most important factor in curtain effectiveness is the air pressure differential across the curtain.

FOR ADDITIONAL INFORMATION: Contact: Jon C. Volkwein, Bureau of Mines, P.O. Box 18070, Pittsburgh, PA 15236; (412) 675-6689.

0896 Better Roof Bolter Dust Collector Maintenance Reduces Silica Dust Levels

Department of the Interior, Washington, DC.

Jun 84 *(D)*

Methods were developed to detect and repair poorly functioning dust collectors on roof bolters. In conjunction with a research project to reduce silica dust in coal mines, a variety of roof bolting machines operating under different conditions were examined to find out how much these machines were contributing to the silica dust problem. The investigation concluded that if the bolting machines' dust collector is properly maintained, very little dust can be measured in the air, even with minimal airflow over the bolter. Poor maintenance, however, frequently results in high dust levels. Three major problem areas were found.

FOR ADDITIONAL INFORMATION: Contact: Edward F. Divers, Pittsburgh Research Center, Bureau of Mines, P.O. Box 18070, Pittsburgh, PA 15236; (412) 675-6825.

0897 Borehole Seismic Unit: Fracture orientation can be measured by using a triaxial geophone package located within the wellhole

Department of Energy, Washington, DC.

May 84 *(C, D)*

The determination of hydraulically-induced fracture orientation is possible with the use of a borehole seismic unit (BSU) consisting of one triaxial geophone package that includes two horizontal and one vertical geophones. The package is clamped in the treatment well near the zone to be fractured; seismic signals then are detected and analyzed to determine the direction of the seismic source. The BSU was fabricated primarily from commercially available components. These components were integrated into an overall system that operates on a single-conductor wire line.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-019845, price code: A01 (Microfiche only). For information not provided in the report, contact Dennis Engi, Division 6256, Sandia National Laboratories, Albuquerque, NM 87185; (505) 844-4831.

0898 Conveyor Belt Service Machine

Department of the Interior, Washington, DC.

Sep 84 *(F)*

Many underground coal mines use a belt haulage system to move cut coal from the face to the loading area. This system usually consists of a main line belt conveyor fed by section belt conveyors. Belt moves, either the extensions or retractions, usually require six to eight workers and three to eight hours to complete. In addition, a 100-foot belt move requires workers to handle up to 4,000 lbs. of material, not including the tail section. A conveyor belt service machine was designed that can handle the heavy portion of this task while reducing the time and number of workers required to perform it. The conveyor belt service machine is self-contained, rubber-tired and capable of handling, storing, and transporting the conveyor belting, wire rope, and support structures needed for section conveyors.

FOR ADDITIONAL INFORMATION: Contact: Mr. William Mayercheck, Bureau of Mines Pittsburgh Research Center, P.O. Box 18070, Cochrans Mill Road, Pittsburgh, PA 15236; (412) 675-6461. Refer to No. 206/TN.

0899 Conveyor Installation Tools

Department of the Interior, Washington, DC.

Oct 84 *(F)*

It was necessary to reduce accidents associated with transporting, installing or maintaining mine conveyor belts by providing easy-to-use tools for use in specific tasks. The Bureau of Mines developed three devices for use on conveyor belt systems (1) for use in moving and positioning conveyor components, (2) to reduce spillage and clean-up around conveyors, and (3) to lessen the maintenance of the belt system. These devices are a saucer skid five feet in diameter with rounded sides and a flat bottom; a torque wrench for tightening the turnbuckle and determining the tension of the ropes in a single step; and a controlled load tensioning device.

FOR ADDITIONAL INFORMATION: Contact: Mr. Theodore J. Williams, U.S. Bureau of Mines Spokane Research Center, East 315 Montgomery Avenue, Spokane, WA 99207; (509) 484-1610. Refer to Sheet 202/TN.

0900 Cost Estimating Methods for Water Supply Planning Are Developed

Department of the Army, Washington, DC.
Aug 84 *(D)*

Methods for estimating cost of typical water supply have been developed. These methods can be used manually or the MAPS (Methodology for Areawide Planning Studies) can be used to produce the estimates. Techniques for verifying cost estimating procedures have also been developed.

FOR ADDITIONAL INFORMATION: Contact: Thomas M. Walski, WESEE-R, U.S. Army Engineer Waterways Experiment Station, P.O. Box 631, Vicksburg, Mississippi 39180; (601) 634-3931.

0901 DC Switching System Rapidly Limits and Interrupts Fault Currents

Department of the Interior, Washington, DC.
Apr 84 *(B)*

A system was developed to rapidly limit and interrupt high dc fault currents with minimal arcing in the mine atmosphere. A dc switching system was designed which uses a pressurized, liquid metal-filled, change-of-state device combined with a conventional interrupter and commutating switch. A commercially viable dc switching system has been developed. The main component of the system, the current limiting device (CLD), functions as a time-dependent, nonlinear resistor. When subjected to high current densities, the highly conductive, pressurized mercury contained in the CLD vaporizes thus increasing the resistance of the device by several orders of magnitude.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB83-120147, price: $13. Additional information or answers to technical questions may be obtained from the Technical Project Officer, Michael R. Yenchek, Bureau of Mines, Pittsburgh Research Center, P.O. Box 18070, Pittsburgh, PA 15236; (412) 675-6637.

0902 Design, Construction and Development of In Situ Mining Wells

Department of the Interior, Washington, DC.
Aug 84 *(D)*

The proper design, construction and development of wells are important to any in situ leaching operation. To permit cost-effective production from an underground ore body by leaching it in place, many wells are normally installed. The Bureau of Mines conducted an investigation to determine the optimum in situ well construction and operating procedures for the minerals industry. Factors considered during the investigation included drilling equipment and procedures; types of well casing and grouting; completion methods, e.g. screening or perforation; and system maintenance. The data collected were used to prepare a manual that offers guidelines for the most efficient construction and operation of in situ mining wells.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB83-183418/NAC, price: $14.50. Answers to technical questions or additional information may be obtained by writing Mr. Daryl R. Tweeton, Twin Cities Research Center, U.S. Bureau of Mines, 5629 Minnehaha Avenue South, Minneapolis, MN 55417; (612) 725-3468.

0903 Determining Tensile Strength of Rocks: Simple, inexpensive method provides tensile strength of rock

Department of Energy, Washington, DC.
Oct 84 *(K)*

A rubber fracturing method determines the tensile strength and deformation modulus of intact rock and rock containing yield fracture. Such measurements are important in liquid-petroleum gas storage in which the apparent tensile strength of the material of the surrounding wall is required, particularly as it relates to cyclic loading and potential fatigue failure. The method is also useful in hydraulic fracturing for the determination of in situ stress or for the recovery of natural gas or other hydrocarbon deposits in relatively impermeable formations. In this method a circular disk of the rock sample is cut out with a diamond saw, then a concentric inner hole is drilled in the sample. A cylindrically-shaped piece of deformable material, such as synthetic rubber, is inserted into the borehole, and the sample is sandwiched between two platens. A load applied to the upper platen causes the rubber insert to expand and eventually crack the disk sample.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PAT-APPL-6,382,997/NAB, price code: A02. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For further information, contact: Joe L. Ratigan, 327 San Marco Boulevard, Rapid City, SD 57701; (605) 394-6400.

0904 Draining Methane From Coal Mines: Removing gas before coal is mined speeds up production

Department of Energy, Washington, DC.
May 84 *(C, D)*

Methane drainage through long horizontal boreholes has been demonstrated to be an effective method of controlling methane emission in gassy coal mines. Moreover, the boreholes produce significant quantities of commercial-quality methane gas. Production data from holes drilled in virgin areas of a coalbed have shown sustained methane flow rates, indicating potential for long-range gas production. The use of the gas to replace pulverized coal and fuel oil in coal dryers has been demonstrated successfully and offers an additional benefit to mining companies.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-017673, price code: A06. For information not provided in the report, contact Charles Byrer, Morgantown Energy Technology Center, P.O. Box 880, Morgantown, WV 26505; (304) 291-4547.

0905 Drill-Pipe Severing Tool for Geothermal Wells: Explosive device is compatible with high borehole temperatures

Department of Energy, Washington, DC.
Aug 84 *(D, F)*

A report describes a special-purpose explosive tool for boreholes designed to meet the needs of drilling in hot rock for geothermal energy development. The tool severs drill pipe stuck in deep, hot, water-filled wellbores. It operates at depths and temperatures up to at least 4,500 m and 320C.

In contrast, conventional severing tools cannot be used at temperatures greater than 260C because they detonate prematurely. The high-temperature resistance was achieved by using a specially formulated high explosive. This material has unsurpassed thermal stability and is relatively insensitive to impact, sparks, and shock.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-021839/NAB, price code: A02.

0906 Electronic Parts for Geothermal-Well Logging: Performance and endurance are examined at high temperature

Department of Energy, Washington, DC.

Apr 84 *(K)*

A new report summarizes the high-temperature characteristics of commercially-available electronic components that may be usable at temperatures up to 275C. The data were compiled as part of a program to develop instrumentation for monitoring the conditions in geothermal wells. The report is not meant to be definitive or complete but only to indicate the general nature of available electronic products and their design and performance limitations at high temperatures. Instrument designers may find it useful as a starting place. The electronic-component information covers passive devices, including capacitors, resistors, thermistors, and magnetics (transformers, windings, and core materials). Active devices include diodes (see figure), field-effect transistors, and ceramic vacuum tubes. Transducers for temperature, fluid flow, pressure, and density are listed. More complex circuits and instruments were examined, including microcircuits, power supplies, and a temperature-measuring/transmitting system. For each topic there is a bibliography with abstracts. Names and addresses of manufacturers are given.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: SAND-81-2112, price code: A11. For information not in the report, contact James R. Kelsey, Sandia National Laboratories, Albuquerque, NM 87185; (505) 844-6968.

0907 Energy and Water Resources: Data on uses, problems, and regulations are presented

Department of Energy, Washington, DC.

Aug 84 *(C, D)*

A handbook 'Energy and Water Resource', part of the Department of Energy's Environmental Information Handbook Series, presents data and other information for those interested in understanding the relationship between water and energy development. Three basic water-energy topics are considered: (1) water quality, (2) water supply, and (3) their institutional framework. A section of the handbook dealing with water-resource topics considers such subjects as water-resource management for energy and nonenergy uses, uses and transfers of water, potential for the increased use of ground water and other alternative water supplies, ground-water contamination, drinking-water-supply protection, and mine drainage.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-005181/NAB, price code: A15.

Environmental Satellite Data and Information
See 0033

EPA Macroscopic Planning Model (EPAMAC) for Stormwater and Combined Sewer Overflow Control: Application Guide and User's Manual
See 0399

0908 Evaluation of Steam Generators for Oil Wells: Downhole steam generation appears to be effective, but corrosion is a problem

Department of Energy, Washington, DC.

Nov 84 *(C, D)*

Results of field tests of two steam generators for recovery of heavy oil in deep wells were made. One generator burned diesel fuel in air and was placed downhole; the other burned diesel fuel in oxygen and was located on the surface. Correlatable increases in oil production and oil/water ratio were seen.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-006306/NAB, price code: A01 (Microfiche only). For information not in the report, contact Bill Marshall, Sandia National Laboratories, Dept. 6250, Albuquerque, NM 87185; (505) 844-2964.

Extracting Oil From Tar Sands: Oil can be extracted using solar energy
See 0328

0909 Flexible Roof Drill for Low Coal: A rod-changer drill system increases drill-bit life by 300 percent

Department of Energy, Washington, DC.

Sep 84 *(D, F)*

A flexible roof drill, termed rod-changer drill, has been designed, fabricated, and tested in an underground environment. The rod changer, capable of operating in coal seams as low as 30 in., performs the drilling of longer than seam-height roof drills by automatically coupling up to six short-drills steel sections to form the drill string. This arrangement permits the operator to perform drilling from a remote location, although bolt insertion requires operator presence in the immediate area.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: FE-9090-1/NAB, price code: A13.

Flood Damage Database Updating Uses LANDSAT
See 0145

0910 Forest Resource Information System: Twenty-three processing functions aid in utilizing LANDSAT data for forest resource management

National Aeronautics and Space Administration, Washington, DC.

Aug 84 *(A)*

LARSFRIS is a multi-image analysis system developed as part of the Forest Resource Information System (FRIS) project to demonstrate the benefits of multispectral-data image processing in forest resource management. LARSFRIS represents a modified version of the LARSYS software developed at the Laboratory for Applied Remote Sensing (LARS) at Purdue University. LARSFRIS consists of 23 integrated processing functions that provide techniques for handling and processing remotely-sensed multispectral and multitemporal data. It is designed to work primarily with digital data obtained from measurements recorded by multispectral remote sensors mounted on aerospace platforms, such as the NASA Landsat satellites.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to MSC-20270/TN.

Gelled Anti-icing Agents: A gelling agent such as pectin is added to an antifreeze/water mixture
See 0099

0911 Guidelines For Accurate Mine Airflow Measurements

Department of the Interior, Washington, DC.
Sep 84 *(K)*

A detailed study was conducted to establish appropriate, generalized correction factors for commonly-used air velocity measurement techniques. The techniques used were centerline readings, continuous traverse and split traverse vane anemometer readings, and smoke cloud readings. The study led to several significant conclusions: Contrary to the findings of earlier investigations, there are no universally applicable correction factors. Much larger error ranges for both anemometer and smoke readings occur at lower velocities.

FOR ADDITIONAL INFORMATION: Contact: Edward D. Thimons, Pittsburgh Research Center, Bureau of Mines, P.O. Box 18070, Pittsburgh, PA 15236; (412) 675-6683.

Guidelines for Placement of Product-of-Combustion Fire Sensors in Underground Mines
See 0491

0912 Headgate to Tailgate Cutting Lowers Longwall Shearer Operators' Dust Exposure

Department of the Interior, Washington, DC.
Jun 84 *(D)*

Dust exposure of longwall shearer operators was reduced by keeping them upwind of the primary cutting drum. This was accomplished by using a different coal cutting sequence by cutting from headgate-to-tailgate. Procedures were developed to aleviate the cut material blocking the under-frame of the shearer.

FOR ADDITIONAL INFORMATION: Contact: Mr. Robert Jankowski, Pittsburgh Research Center, P.O. Box 18070, Pittsburgh, PA 15236; (412) 675-6691.

0913 How to Reduce Shearer Operators' Dust Exposure By Using Remote Control

Department of the Interior, Washington, DC.
Sep 84 *(D)*

The latest generation of longwall shearers has features that make the use of radio remote or umbilical (hard wire) remote control relatively easy to implement. Remote control can enable shearer operators to control machines from positions that are less dusty than normal control stations. With either type, the head-drum operator can now control the shearer from a position up to 20 feet on the intake-air side of the shearer, while the tail-drum operator's station is now located across from the head drum. The equipment for radio remote control is available but has not been widely used in the U.S. due to its relative complexity. Umbilical remote controls are easy to retrofit to modern shearers. With some improvements in ruggedness, but without expensive modifications to machines or the use of inefficient cutting cycles, they will provide simple fail-safe operation.

FOR ADDITIONAL INFORMATION: Contact: Robert A. Jankowski, Bureau of Mines, Pittsburgh Research Center, P.O. Box 18070, Pittsburgh, PA 15236; (412) 675-6691. Refer to Tech News 203.

0914 Impact of Land-Based Biomass Production: Several models are evaluated

Department of Energy, Washington, DC.
Oct 84 *(C, E)*

The methods of determining the potential overall impact of land-based biomass production on agricultural and forestry sectors of the U.S. economy are discussed. Estimates of the total amount of biomass that could be produced from crops, wood, and grasses are important for determining the degree to which biomass-derived fuels and chemical feedstocks can displace fossil fuels without adversely affecting agricultural and forestry activities.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-003333/NAB, price code: A03. For information not in the report, contact: Sinyan Shen, Argonne National Laboratory, 9700 South Cass Avenue, Argonne, IL 60439; (312) 972-6276.

0915 Improved Coal-Thickness Measurement: Summed signals and a dielectric-filled antenna improve the measurement

National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(B, D, K)*

An improved FM radar for measuring the thickness of a coal seam eliminates spectrum splitting and reduces the magnitude of the echo from the front coal surface. To eliminate spectrum splitting, which produces two apparent echoes and reduces the operator's ability to determine target range, the FM signal is produced by combining the usual frequency ramp with a lower frequency signal. The return signals are mixed with a sample of the transmitted signal to create difference-frequency signals for a spectrum analyzer.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to Leon D. Wofford, Jr., George C. Marshall Space Flight Center, Mail Code: CC01, Marshall Space Flight Center, AL 35812; (205) 453-0020. In either case refer to MFS-23721/TN.

0916 Improved Fire Doors For Noncoal Underground Mines

Department of the Interior, Washington, DC.
Apr 84 *(D)*

There was a need to prevent the propagation of a fire and control the spread of smoke and toxic gas in underground mines. A fire door suitable for large openings in underground noncoal mines and providing protection for openings requiring 1 1/2 hours of fire resistance, a 250F maximum temperature rise, and high pressure differentials was designed, laboratory tested, and in-mine tested. The door is a double-acting swing type. Its two panels, connected by an overhead linkage, open in opposite directions. Consequently, high pressure differentials across the door have little effect on the force required to open and close the door.

FOR ADDITIONAL INFORMATION: For construction drawings, a bill of materials, and additional information, contact the principal investigator for this research, William H. Pomroy, Bureau of Mines, Twin Cities Research Center, 5629 Minnehaha Ave. S., Minneapolis MN 55417; (612) 725-3469.

0917 In-Mine Remote Actuated Stench Gas Warning System

Department of the Interior, Washington, DC.
Apr 84 *(K)*

An inexpensive, remote actuated, stench-gas system which reduces fire warning time to underground work locations was developed. A mine's paper phone hardwire network is used to release stench gas from pressurized canisters located near working areas. The release is initiated by placing a coded message into a control phone at some central location..

FOR ADDITIONAL INFORMATION: Contact: Edward D. Thimons, Pittsburgh Research Center, Bureau of Mines, P.O. Box 18070, Pittsburgh, PA 15236; (412) 675-6683.

0918 Instrumented Pick Detects Coal/Rock Interface: Strain-gage signals indicate whether coal or rock is being cut

National Aeronautics and Space Administration, Washington, DC.
Feb 84 *(D, K)*

A cutting-force measuring system will provide more-efficient automatic guidance of coal shearers in longwall mining. A signal from a sensitized pick on the cutting drum of a coal shearer is analyzed in real time to permit automatic control of the cutting drum. The objective of the system is to move the cutting drum so that it closely follows the coal/rock interface. The coal/rock detection algorithm used in the tests employs a ratio technique: A low-pass-filtered value of the peak signal occurring during an interval at the leading edge of the signal is compared to the average amplitude of the entire signal.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25731/TN.

Longwall Coal Mine Respirable Dust Sources
See 0407

Measuring Snow's Liquid Water Content
See 0522

Measuring Temperature Profiles of Earth's Surface: Thermal properties of earth are measured in situ
See 0524

0919 Mechanical Coal-Face Fracturer: Radial points on a proposed drill bit would take advantage of the natural fracture planes of the coal

National Aeronautics and Space Administration, Washington, DC.
Dec 84 *(F)*

A modified drill bit proposed for mining coal would include a group of impact-driven points to fracture and breakup a coal face. The modified bit would take advantage of available drill machines that sink as many as 12 holes into the working face at one time. Conventionally, the coal is broken up by mechanically sawing it or by loading the holes with blasting powder. The points, however, would shatter the coal face by impacting the natural fracture planes of the coal.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15847/TN.

Methane Hydrate - a Curiosity or a Vast Energy Resource: This icelike mixture may become a major source of natural gas
See 0356

0920 Methods for Determining the Location of Abandoned Wells

Environmental Protection Agency, Washington, DC.
Aug 84 *(D)*

Improperly plugged or unplugged abandoned wells that penetrate an injection formation may provide a conduit for migration of injected fluids into fresh water formations. To help minimize this serious environmental threat, all abandoned wells within an area of review around a proposed injection well should be located and their condition assessed. To date, few methods have been successfully used to search for abandoned wells. A study reviewed the application of methods which historically have been used to locate abandoned wells including record searching, talking with residents, using visual and logical clues to look for the well. Other technologies include geophysical methods such as electrical resistivity, electromagnetic conductivity and ground penetrating radar, remote sensing techniques such as black and white aerial photographs, color photographs, color infrared imagery and thermal imagery, and indirect methods such as water-level measurements or actual injection. The techniques covered may also be applicable to locating abandoned water wells, mineral exploration boreholes, engineering borings, and similar subsurface excavations.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB84-141530/NAC, price: $14.50, or contact Jerry Thornhill, Robert S. Kerr Environmental Research Laboratory, U.S. Environmental Protection Agency, P.O. Box 1198, Ada, OK 74820.

0921 Microbial Enhancement of Oil Recovery: Bacteria aid in oil production and utilization

Department of Energy, Washington, DC.
Sep 84 *(C)*

The Proceedings of the 1982 International Conference on Microbial Enhancement of Oil Recovery are now available. The conference papers cover a variety of basic and applied research topics organized into four main areas: microbes and their metabolites, transport of bacteria in porous geological materials, application to heavy oils, and field applications. The research in this field is directed at both the removal of crude oil from the ground and the synthesis of biochemical products from crude oil or its distillates.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-009741/NAB, price code: A10. For information not in the report, contact: Herbert B. Carroll, National Institute for Petroleum and Energy Research, P.O. Box 2128, Bartlesville, OK 74005; (918) 337-4297.

Modified Antifreeze Liquids for Use on Surfaces: Viscosity agents and antifreeze liquids are evaluated
See 0803

0922 Natural Gas Prospects in the Devonian Shales of the Eastern United States: Comprehensive study provides evaluation of natural gas resources in the Devonian Shale

Department of Energy, Washington, DC.
Oct 84 *(C)*

The results of an extensive study are available on the potential natural gas resources entrapped in the Devonian shales of the Appalachian, Michigan, and Illinois Basins. Estimates of total natural gas resources range from 500 to 1,100 trillion cubic feet in this region where low-volume, low-pressure production has been performed since 1821. The study presents the regional geology of the Devonian shale deposits and detailed stratigraphy of local areas showing the distribution of the shale and its interrelationship, correlation, and boundaries.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-008749/NAB, price code: A08. For information not in the report, contact: Charles A. Komar, Morgantown Energy Technology Center, P.O. Box 880, Morgantown, WV 26505; (304) 291-4107.

New Technology Stretches Scarce Water for Irrigation
See 0028

0923 New Way to Preserve Antifreeze Has Been Developed

Department of the Army, Washington, DC.
Jun 84 *(H)*

A new method of preserving antifreeze has been developed at the Belvoir Research and Development Center that could save the service millions of dollars annually. The liquid chemical extender should prolong the life of used antifreeze at least four years. By utilizing the Army's Reserve Alkalinity Test Kit, personnel can quickly identify ineffective antifreeze and then add the extender.

FOR ADDITIONAL INFORMATION: Contact: Jim Conley, U.S. Army Belvoir R&D Center, Fort Belvoir, VA 22060; (703) 664-3576.

Numerical Models of Water Quality Conditions Are Developed
See 0419

0924 On-Site Assaying of Uranium Ore: Borehole probe produces and measures the radioactivity of in-place earth samples

Department of Energy, Washington, DC.
Sep 84 *(J, K)*

A photoneutron probe determines the amount of uranium ore adjacent to exploratory boreholes. A prototype model of the probe has been tested in the field. The probe performs assays in the boreholes. It therefore allows faster and less expensive surveys than conventional equipment, since it is unnecessary to remove core samples and analyze them in a laboratory. An arsenic-124 gamma-ray source, in combination with a beryllium converter, produces neutrons that diffuse into the formation surrounding the borehole. The neutrons cause fission in any uranium-235 that might be present. The fission neutrons that return to the probe are counted and their energy is analyzed by a high-pressure helium detector, which provides a signal indicating the concentration of uranium.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-019712/NAB, price code: A03.

0925 Predicting Rubble Motion in Blasts: Computer model makes it possible not only to blast rock but also to move the broken rubble in a predictable manner

Department of Energy, Washington, DC.
Sep 84 *(D)*

A report presents an engineering model that describes the long time motion of rubble during blasting. The model provides the blast engineer with a tool for evaluation and further refinement of blasting patterns and timing sequences. The rock medium is represented by a discrete series of circular regions of fractured material. The regions are set in motion by pressure loads from the explosive. The motion is calculated by a step-wise explicit numerical time-integration method. Interaction of adjacent regions is based on inelastic impact of spherical bodies. The motion model is the basis for a FORTRAN computer model which calculates and plots the time-dependent quantities.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-007095/NAB, price code: A02. For information not provided in the report, contact John T. Schamaun, Sandia National Laboratories, Division 6247, Albuquerque, NM 87185; (505) 844-3946.

0926 Pressurized Slurry-Feed System: System avoids pumpage dilution and contact between pumps and abrasive liquids

Department of Energy, Washington, DC.
Dec 84 *(C, D)*

An improved slurry-feed system incorporating direct-contact hydraulic-exchange pumping principles for pressurizing highly concentrated slurries prevents premature deterioration of the pumps that feed such slurries through the pipelines and avoids dilution of the pumpage with motive fluids. Through a special arrangement of conduits, valves, transfer tanks, and purges, the slurry essentially bypasses the pump. The principles of the system can be applied to the transfer of other materials. Cement mixtures, grouting material, drilling mud, and other abrasive liquids can be transferred without affecting the pump.

FOR ADDITIONAL INFORMATION: For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. Refer to PAT-APPL-6-408,092/TN. For further information, contact: Joel R. Horton, Oak Ridge National Laboratory, P.O. Box X, Oak Ridge, TN 37831; (615) 574-3121.

Procedures For Airborne Sensors Are Developed
See 0551

Processing and Enhancement of Weather Radar Data
See 0036

0927 Quieted Hand-Held Percussion Drills

Department of the Interior, Washington, DC.
Dec 84 *(F)*

Percussion drills are the noisiest machines used in underground mines; noise levels of 115 to 120 dBA are common. Hand-held pneumatic percussion drills pose a particularly difficult problem because the operator cannot be isolated from the noise source. Two similar but slightly different drills were developed--a 'coal stoper' for drilling roof bolt holes in coal mines, and a more powerful 'hard rock' drill for production blastholes. These drills share several important design features found in no other rock drills of their class. First, the drill hammers have been redesigned to perform the airporting functions normally achieved through a complex series of valves. Second, gear-type independent rotation motors replace the standard rifle bar and pawl system as the means of achieving drill rod rotation. Third, the drill cylinders surrounding the hammers are isolated from the outer drill covers through rubber vibration-isolation pads.

FOR ADDITIONAL INFORMATION: Contact: Mr. William W. Aljoe, at the Bureau of Mines' Pittsburgh Research Center, P. O. Box 18070, Cochrans Mill Road, Pittsburgh, PA 15236; (412) 675-6831.

0928 Reducing Longwall Face Workers' Respirable Dust Exposure From Roof Support Movement

Department of the Interior, Washington, DC.

Sep 84 *(D)*

Studies have shown that on some longwall faces support dust can contribute over 30 percent of the respirable dust exposure of face workers. Dust exposure of shearer operators and support movers can be controlled in many ways. Several of these methods follow. Use of water to hose down supports and roof. Another method involves support movement practices. Where water application can cause deterioration of the roof and floor, the minimizing of dust on supports or operator location can be undertaken.

FOR ADDITIONAL INFORMATION: Contact: John A. Organiscak, Bureau of Mines, Pittsburgh Research Center, P.O. Box 18070, Pittsburgh, PA 15236; (412) 675-6675.

0929 Retort Utilizes Oil-Shale Fines: Additional energy is extracted, and waste disposal is simplified

Department of Energy, Washington, DC.

May 84 *(D)*

Oil-shale particles of about 0.5 in. or smaller size are converted to useful forms in a new retort system. Typical oil-shale utilization processes reject these particles (called fines) because they cause equipment blockages. Because fines constitute about 10 percent of oil shale, the new retort system will substantially increase energy production while simplifying a large waste-disposal problem. The particles are fed into a cyclone retort chamber by the injection of hot burner-exhaust gases into a stream.

FOR ADDITIONAL INFORMATION: For licensing information, contact: Office of Assistant General Counsel for Patents, US DOE, Washington, DC 20585. For further information, contact Arnold E. Harak, 1507 Mitchell, Laramie, WY 82070; (307) 745-8200.

0930 Scrubber in Blowing Section Offers Good Ventilation Taking 50 Foot Cuts

Department of the Interior, Washington, DC.

Dec 84 *(D)*

Blowing ventilation systems are commonly used in mines because the high velocity air stream created by these systems rapidly mixes with and dissipates methane generated during the cutting of coal. A drawback to blowing ventilation is that the work area is placed in return air and this may create dust compliance problems. To clean dust from the return a number of mining machine manufacturers supply dust scrubbers built into the machine. A six week in-mine study of face ventilation effectiveness was made by comparing the existing MSHA-approved blowing curtain setback distance of 25 ft with brattice set back distances of up to 50 ft. Effectiveness was determined by measuring methane levels at the face and in the immediate return.

FOR ADDITIONAL INFORMATION: Contact: Jon C. Volkwein Bureau of Mines, Pittsburgh Research Center, Cochrans Mill Road, Box 18070, Pittsburgh, PA 15236; (412) 675-6689.

0931 Short-Rotation Forestry: Current state-of-the-art and future research topics are described

Department of Energy, Washington, DC.

Oct 84 *(C, E)*

A report was published that provides an introductory review of short-rotation forestry, identifies potential research and development topics, and presents a model for performing cost-benefit analyses and maximizing the net value of short-rotation forestry resources. Wood produced from such plantations can be used not only for fuel applications, such as direct combustion, air gasification to produce low- and medium-Btu gas, and conversion to liquid fuels, but also for chemical feestocks and modern paper-making processes.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-010318/NAB, price code: A04. For information not in the report, contact: Sinyan Shen, Argonne National Laboratory, 9700 South Cass Avenue, Argonne, IL 60439; (312) 972-6276.

0932 Shuttle-Car System for Continuous Mining: Buffer storage catches the coal production between loadings

National Aeronautics and Space Administration,
Washington, DC.

Dec 84 *(D, F)*

A proposed shuttle-car system would increase the rate of coal transport and allow a mining machine to operate continuously. The system is not inherently restricted to coal mining and may prove economical for hauling other solid materials. In the new system, coal from a conveyor is fed continuously to a telescoping reservoir. The end of the conveyor moves back and forth under microprocessor control to insure an evenly distributed full load. As the reservoir is filled, the tailgate of a car is let down, and the car is moved into place under the reservoir. When the reservoir is full, its end-gate is pulled away to allow the coal to slide into the car.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to Paul F. McCaul, NASA Resident Office-JPL, Mail Code: 180-601, 4800 Oak Grove Drive, Pasadena, CA 91103; (213) 354-2700. In either case refer to NPO-15949/TN.

Small Diameter Pumps for In Situ Leaching
See 0714

Standardized Procedures for Planting Vegetation on Completed Sanitary Landfills
See 0433

Tester for Friction Rock Supports
See 0572

Tool For Rangeland Management and Research Is Developed
See 0032

0933 Video Disks Make Maps Manageable

Department of the Army, Washington, DC.

Mar 84 *(A)*

Video disks provide an efficient way to store and retrieve almost any type of information. Paper maps, digital cartographic data and remotely sensed imagery can all be recorded on disks. A video map atlas, consisting of a video disk player and a library of map disks, would represent a significant improvement over traditional methods of storing and locating map information. By linking the video disk player with a microcomputer, scientists create an active tool for manipulating map data. For example, computer-generated graphics can be overlaid on top of video disk background maps for the quick display of new information. Researchers are evaluating a prototype video disk which features map coverage of Cache, Okla. This disk contains LANDSAT imagery and aerial photography as well as maps and charts.

FOR ADDITIONAL INFORMATION: Contact: Mr. Richard Foreman, Engineer Topographic Laboratory, Bldg. 2592, Fort Belvoir, VA 22060.

WATEQF - A FORTRAN IV Version of WATEQ, a Computer Program for Calculating Chemical Equilibria of Natural Waters (1984 Version)

See 0141

NUCLEAR SCIENCE & TECHNOLOGY

Charged-Particle Flux Sensor: Improved design has greater collection efficiency

See 0456

Coolant-Level Sensors for Nuclear Reactors: Proposed sensors detect the loss of coolant at an early stage of an accident

See 0460

0934 Dual-Function Treatment for Nuclear Waste: Process prepares spent radioactive fuel for storage and extracts noble metals from it

Department of Energy, Washington, DC.

Jan 84 *(D)*

A new process for treating nuclear-reactor waste not only seals the waste for long-term storage but also recovers valuable metals from it. From 1 metric ton of spent nuclear fuel, the process can extract about 2 kg of ruthenium, 0.5 kg of rhodium, 1.5 kg of palladium, and 0.5 kg of technetium--metals that are in demand as catalysts and as special materials of construction. The fission waste is mixed with a glass former, a reducing agent, and a scavenger. The reducing agent reacts with the scavenger to produce molten scavenger metal. Because of its greater density, the metal settles to the bottom of the molten glass, carrying with it the noble metals. The glass, including the nuclear waste, can then be poured off.

FOR ADDITIONAL INFORMATION: For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. Refer to PAT-APPL-6,322,144.

Evaluation of High-Efficiency Particulate Air Filters: Structural test results characterize ventilation filters for nuclear facilities

See 0632

0935 Fabrication of Hollow Spheres: A nozzle forms gas-filled spherical shells of high dimensional uniformity

National Aeronautics and Space Administration, Washington, DC.

Dec 84 *(G)*

An improved apparatus forms uniform gas-filled spheres. The apparatus contains a nozzle through which a liquid and a gas flow simultaneously, with the liquid becoming the constituent material of the shell wall. The design exploits and optimizes the inherent tendency of a liquid column or filament to breakup into droplets, which are hollow in the present case. The outer diameter of a shell depends principally on the size of the orifice. There is a linear relationship between the two, with the shells being approximately twice the diameter of the nozzle opening. A measure of control of the wall thickness can be exercised by adjusting the annular gap and the liquid pressure.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15798/TN.

0936 Hand-Held Field Spectrometer: Portable spectrometer employs microprocessor to provide extended analysis of radiation sources

Department of Energy, Washington, DC.

May 84 *(B, E, J, K)*

An integrated spectrometer consists of power source, detector, electronics, display, and controls contained in a single hand-holdable package. The instrument can be used in the fields of health physics, nuclear waste management, mineral prospecting, nuclear safeguards, and other similar areas. Conventional spectrometers use high-power-consumption components, requiring battery supplies too large and cumbersome for field applications. The detector is a sodium iodide crystal. Reduction in the size of the instrument is possible from the use of low-power CMOS components, digital circuitry, and LCD's. The instrument requires only four AA-size Ni/Cd batteries.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-020875, price code: A03. For licensing information, contact: Office of Assistant General Counsel for Patents, US DOE, Washington, DC 20585. Refer to PAT-APPL-6-317, 816.

Hollow-Sphere Production Line: After initial formation, spheroids are processed without the contaminating touch of solid objects

See 0651

Hydrogen Production Driven by Fusion Reactor: Heat from the reactor blanket is joule-boosted to allow noncatalytic conversion of SO3 to SO2

See 0340

Improvements in Gamma-Ray Coal-Level Sensors: Instrumentation is evaluated at an existing coal-gasification facility

See 0497

Instrument is Developed for Ramp Injection of Radiotracers for Blood Flow Measurement by Emission Tomography

See 0052

0937 Interim Radioactive-Waste Storage: A relatively inexpensive method produces high-level radioactive wastes for transport and temporary storage

Department of Energy, Washington, DC.
Nov 84 *(D)*

Radioactive waste combined with sodium silicate forms a water-insoluble material suitable for transportation or temporary storage. This interim form of handling radioactive waste requires only simple onsite conversion without extensive additional facilities. The converted material is physically and mechanically stable under ambient conditions and in fire produces a low percentage of fines when impacted and is resistant to water leaching. The process involves mixing calcined radioactive waste with anhydrous sodium silicate.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent Application 6-383,880, which is available from: Commissioner of Patents, Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For further information, contact: Dr. Roger B. Poeppel, Materials Science and Technology Division, Argonne National Laboratory, 9700 South Cass Avenue, Argonne, IL 60439; (312) 972-5097.

Low Temperature Properties for Fusion Magnets Are Produced
See 0266

Magnetic Flowmeter for Electrically Conductive Fluids: Improved accuracy is provided with minimum recalibration requirements
See 0510

Measuring Nuclear Fuel Temperatures: Ultrasonic-thermometer system offers the most practicable alternative
See 0518

0938 National Laser Users Facility: Experiments in High Energy-Density Physics

Department of Energy, Washington, DC.
Oct 84 *(J)*

Experiments in high energy-density physics are accessible at the University of Rochester. High energy-density physics experiments utilize an intense pulse of laser light focused to a diameter of approximately .001 cm. Intensities of 10 to the 17 W/sq cm can be created. This point-source plasma provides the necessary conditions for studies of thermonuclear fusion, spectroscopy of highly ionized atoms, shock waves, laboratory astrophysics, or the fundamental physics of matter under high intensities. The U.S. Department of Energy has designated the laboratory as a national facility, available to qualified researchers nationwide. The Department of Energy supports facility operation and provides research contracts for user experiments in laser fusion, plasma physics, and associated applications. The 24-beam OMEGA laser system provides the main high-power irradiation capability for user experiments. OMEGA is a multi-kilojoule laser with operating wavelengths of 1054 and 351 nm.

FOR ADDITIONAL INFORMATION: Contact: Thomas C. Bristow, National Laser Users Facility Laboratory for Laser Energetics, University of Rochester, 250 East River Road, Rochester, NY 14623; (716) 275-2074.

National Tritium Labeling Facility
See 0870

On-Site Assaying of Uranium Ore: Borehole probe produces and measures the radioactivity of in-place earth samples
See 0924

Packaging Nuclear and Chemical Waste for Disposal: Waste would be encapsulated in hollow silicon spheres
See 0422

A Portable Radiation Monitor: Battery-operated monitor detects and identifies radiation on site
See 0547

Resonance Ionization Mass Spectrometry
See 0131

Survivability of Nuclear-Waste Casks: Test program simulated railroad accidents to evaluate the safety of these casks
See 0568

Tiny Radiation Warning Devices: Miniature radiation warning device that enhances nuclear industry worker safety
See 0438

Viewer Makes Radioactivity Visible: A battery-operated viewer could aid in contamination surveys and medical diagnoses
See 0585

Wristwatch Dosimeter: Besides telling the time, a device indicates radiation dosage and dosage rate
See 0587

OCEAN TECHNOLOGY & ENGINEERING

Automated Plankton Sorting System
See 0844

Cable Fires Studied
See 0229

Coating for Carrier Decks Improved
See 0004

0939 Compliant Coatings for Turbulent Drag Reduction Under Development

Department of the Navy, Washington, DC.
Aug 84 *(D)*

Scientists and engineers at the David Taylor Naval Ship Research and Development Center (DTNSRDC) are working on a practical, passive drag reduction system for a spectrum of hydrodynamic applications. A 'passive' system does not require an external source of energy or material like an 'active' system, such as boundary layer suction or polymer injection. The specific type of device presently under investigation consists of a compliant (i.e. elastic yielding) coating, which is applied permanently to the external surface of a ship hull, in order to reduce turbulent drag. The approach consists of developing impedance matching equations to identify regions of strong response to a turbulent boundary layer.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, VA 22448. Refer to 080902/TN.

0940 Control of Decay in Above-Water Marine Pilings

Department of Agriculture, Washington, DC.

Dec 84 *(D)*

Wood is one of the most widely used materials for piers and wharfs. However, each year millions of dollars of above-water marine structures are lost to decay because the wood is inadequately treated. Recent research conducted by the Forest Products Laboratory in cooperation with the U.S. Naval Facilities Engineering Command has shown that two simple in-place treatments can be used to prevent above-water decay and extend service life of marine pilings at least 10 years. The first technique involves in-place application of ammonium biflouride, to the top surface of cut-off piles. The second technique, used in conjunction with the first, involves the application of a coal-tar coating 'cap' on top of the treated cut-off pile.

FOR ADDITIONAL INFORMATION: Contact: Terry Highley, Forest Products Laboratory, P.O. Box 5130, Madison, WI 53705; (608) 264-5613.

0941 Engineering Data Base Aids in Selection and Sizing of Anchors

Department of the Navy, Washington, DC.

Jan 84 *(D)*

To improve the Navy and commercial sector's capabilities to understand, design, and install more demanding and complex moorings, the Naval Civil Engineering Laboratory (NCEL), is developing an engineering data base to take the guesswork out of the selection and sizing of anchors. The Navy now has a better understanding of what causes erratic anchor behavior and now knows what should be avoided in specifying anchors and installation procedures for specific applications. This new understanding allows Navy engineers to improve anchor behavior by modifying anchor configuration. Data provides insight that permits engineers to make simple and quick alterations to anchors.

FOR ADDITIONAL INFORMATION: Contact: Navy Technology Transfer Fact Sheet, Code E411, Naval Surface Weapons Center, Dahlgren, VA, 22448. Refer to 080701.

0942 Floating Breakwater Research Is Developed

Department of the Army, Washington, DC.

Feb 84 *(D)*

Research is being conducted on floating breakwaters. Design guidance based on a prototype test should be available in September 1984. A structural/hydraulic numerical model for the caisson-type floating breakwater is being verified using the results from the prototype test. Floating breakwaters can be quite effective in certain situations, particularly where deep water conditions exist and/or water levels fluctuate widely (such as reservoirs). Floating breakwaters can also be used as temporary applications such as the protection of areages and marine construction equipment. Patents do exist on some of the floating breakwater design concepts, for example, the wave maze is a patented design.

FOR ADDITIONAL INFORMATION: Contact: Mr. Joseph Dawsey, U.S. Army Engineer Waterways Experiment Station, P.O. Box 631, Vicksburg, MS 39180; (601) 634-2767.

0943 Nearshore Sediment Transport Study, Torrey Pines Experiment

Department of Commerce, Washington, DC.

Jan 84 *(D)*

The National Oceanographic Data Center (NODC) announces the availability of data from the Torrey Pines Experiment, the first field experiment of the Nearshore Sediment Transport Study (NSTS). Its objective is development of improved engineering prediciton techniques for sediment transport by waves and currents in the nearshore region. The major objectives were: (1) to characterize the nearshore velocity field in relation to the incident wave field, (2) to obtain measurements of longshore transport rates by means of tracer studies and of on-offshore transport by means of profile analysis, and (3) to evaluate promising techniques for continuous point measurements of suspended sediment and bedload transport concurrently with measurement of the local velocity field. The data record contains approximately 16 million data points collected over a span of three weeks. The data are assembled into eight 2400-foot magnetic tapes.

FOR ADDITIONAL INFORMATION: Contact: National Oceanographic Data Center, User Services Branch, NOAA/NESDIS E/OC21, 2001 Wisconsin Avenue, N.W., Washington, D.C. 20235; (202) 634-7500.

0944 The Ocean Pollution Data and Information Network (OPDIN)

Department of Commerce, Washington, DC.

Feb 84 *(D, E)*

The network is being established to improve dissemination of data and information resulting from ocean pollution programs conducted or sponsored by the U.S. Federal government. The OPDIN is being developed as a coordinating mechanism to make these data and information more accessible and useful, in response to the National Ocean Pollution Planning Act of 1978 (P.L. 95-273). It is intended to supplement (rather than replace) existing agency data and information sources and utilizes existing facilities where possible. A central office provides or assists in providing specific ocean pollution information or data and data products from Federal sources, as well as from state agencies, academic institutions, and other non-Federal facilities associated with Federal activities.

FOR ADDITIONAL INFORMATION: Contact: NOAA Office of Research and Technology Applications, Mail Stop D, Room 3308, FB4, Suitland, MD 20233; (301) 763-2419.

0945 Procedure For Benthic Resources Assessment (BRAT) Has Been Developed

Department of the Army, Washington, DC.

Mar 84 *(E)*

A procedure for measuring the value of small animals that inhabit the muddy and sandy bottoms (benthos) of estuaries and coastal waters, and expressing that value in terms of food for important commercial and sportfishes. State/local governments or private industry would be able to apply the BRAT in any construction project or operation conducted in estuarine or marine locations where there is a requirement to (a) document the value of aquatic animal resources in the project area or (b) predict or measure the environmental impacts of the project on commercial and sportfishes.

FOR ADDITIONAL INFORMATION: Contact: John Lunz, USAE Waterways Experiment Station, P.O. Box 631, Vicksburg, MS 39180; (601) 634-3303.

0946 Radar for Mapping Sea Ice: X-band system would have 100 sq m resolution
National Aeronautics and Space Administration,
Washington, DC.
Aug 84 *(B, K)*

A concept for a spaceborne synthetic-aperature radar (SAR) meets the functional requirements for continuously mapping sea ice in the north and south polar regions. The design is an outgrowth of existing SAR's operated from aircraft and spacecraft and should interest those involved in the design and use of such radar systems. The radar would operate in the X-band (9.6 GHz) from a satellite in a 700-km near-polar orbit.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Division, P.O. Box 8757, BWI Airport, MD 21240. Refer to NPO-15350/TN.

0947 A Test for the Recovery of Waste Energy in a Fishing Vessel
Department of Commerce, Washington, DC.
Jan 84 *(C, D)*

A heat recovery system was designed and installed in a vessel of the New England fishing fleet. The system supplies heat recovered from the engine cooling water to the crew's quarters, galley, pilot house, engine room, and supplies all the required domestic hot water for the vessel. The vessel is 77 feet long, steel hulled, with a hold capacity of 200,000 pounds and 100 gross tons. Even with the sub-optimal installation (only about one-sixth of the potentially available heat energy was recovered) a savings of approximately $26 per day in fuel costs was realized. It is estimated that this system, with proper pipe size will significantly increased the savings in fuel and dollars.

FOR ADDITIONAL INFORMATION: Contact: Edward V. Tiernan or Patricia Atkinson, NOAA/NESDIS/ORTA, FB4, Room 3308, Mail Stop (D), Suitland, MD 20233; (301) 763-2419.

PHOTOGRAPHY & RECORDING DEVICES

Automated Plankton Sorting System
See 0844

0948 Automatic Control of Multimedia Shows: An audiovisual program is synchronized digitally
National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(B)*

A digital controller synchronizes the events in a multimedia simulation of a rocket firing at Kennedy Space Center. The presentation employs two movie projectors, four slide projectors, an audio tape player, countdown clocks, and lights, consoles, and segmented display boards. The controller synchronizes over 60 events to the two 16-millimeter movies regardless of speed variations in the movie projectors. A serial time code is recorded on the tape with the show narration, which is electrically synchronized with the movie films. Events are controlled by the time code and thus start and stop at the proper time in relation to the movies.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: KSC-11080/TN.

Calibration Markers Produced for Video Camera
See 0230

0949 Electronic Score Pad Developed
Department of the Navy, Washington, DC.
Aug 84 *(A, B)*

A scoring system developed by the Naval Weapons Center, China Lake, Calif., includes a plurality of hand-held programmable electronic score pads, a data interface device, and a general-purpose computer. Students enter identifying data and answers into a data memory of the pads. Each pad subsequently is inserted into a data interface device whereupon the data memory is dumped, upon command, into a general-purpose computer for analysis of the data and future presentation. The data is optically transmitted to the interface device which converts it to a format acceptable to the general-purpose computer. Each pad has a multitude of features to facilitate data entry controlled by a microprocessor pre-programmed to sequence in a desired manner.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, VA 22448. Refer to 090303/TN.

0950 Flash X-Ray Cineradiography: Framing rates up to 100,000 frames per second are possible to record fast events
Army Materiel Development and Readiness Command,
Alexandria, VA.
Sep 84 *(K)*

Several of the problems of high-speed flash radiography have been resolved with the development of an X-ray cineradiography system that incorporates novel flashing and recording techniques. The system, developed by the U.S. Army Armament Research and Development Command, is capable of very high framing rates without incurring the limitations of parallax, inadequate penetration, and loss of resolution experienced with previous systems. Effective exposure is accomplished with multiple 150 keV flash X-ray tubes mounted side by side in a specially designed head. A special pulsing circuit synchronizes the sequential opening of the shutters on the intensifier tubes with the sequential flashes of the X-ray sources, resulting in the continuous recording of 70-ns exposures.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A129090/NAA, price code: A02, or contact project officer C. L. Aseltine (301) 278-2170.

Holographic Interferometry for Large Structures: Whole vehicular components can be analyzed
See 0493

0951 Imaging Bubble Formation In a Drop Tube: The entire process is under control of a computer
National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(J, K)*

A computer-controlled image-acquisition system tracks an object, such as a water bubble, as it moves in a drop tube. Ultimately, such a tracking system will be used to observe fusion-pellet formation in a drop furnace. To observe the formation/deformation of a bubble in a drop tube, the bubble is illuminated by xenon flashlamps and imaged by video cameras. All imaging data are stored on a video disk. By placing the entire process under the control of a computer, individual frames can be accessed quickly and efficiently, either in sequence for a single droplet or drop-to-drop at a single station.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15114/TN.

Multiple-Image Holographic Matched Filter: New technique for making holograms greatly increases storage density
See 0975

Photographic Film Tested on Space Shuttle Flights
See 1005

Portable Data Logger for Photovoltaic Panels: Instrument measures rapidly changing knee of V-I curve with extra care
See 0545

0952 Preserving Color in Developed Photographic Film: Sealed storage container has moist nonoxidizing atmosphere to retard fading
National Aeronautics and Space Administration,
Washington, DC.
Apr 84 *(D)*

A controlled-atmosphere vault retards the fading and deterioration of developed high-speed film. Although refrigerators and other cool, dry areas are satisfactory for the storage of relatively stable film, the color dyes fade in some high-speed films, even in such facilities. The vault contains an externally controlled tank of gas (usually nitrogen) with a perforated gas-distribution tube, an air purge valve, a film rack, and a sealable cover. The dry gas forces the original air out through the purge valve sealing the film in a nonoxidizing atmosphere for storage.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-23250/TN. This technology is available for licensing.

0953 Removing Images From Microfilm: The film is softened, scraped, and then dried
National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(H)*

Unwanted images can be removed from microfilm by softening the base film with hot water, scraping the film, and drying it with isopropyl alcohol. The method is simple, and there is no visible damage to the film. To remove unwanted images from microfilm, the base film first is softened with hot water heated to 80 C. Then, the film is gently scraped with a blunt metal spatula or a tetrafluoroethylene policeman and dried.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15146/TN.

Sharp-Focus Composite Microscope Imaging by Computer: Enhanced depth of focus aids medical analysis
See 0561

Simplified Laser Tuning: Tuning arrangement employs a single grating and two planar mirrors
See 0989

Video Disks Make Maps Manageable
See 0933

0954 Videodisc Technology Is Applied To Visual Display Systems
Department of the Air Force, Washington, DC.
Dec 84 *(A)*

The Human Resources Laboratory is investigating the extension of a contractor-developed videodisc visual system technology to fighter combat training requirements. The objective is to validate, by non-real-time emulation, the concepts developed under the study phase for providing a low-level, high-speed display. Low-altitude photographs have been taken of potential routes in which to emulate the feasibility of the separate region mapping concept to low-level, high-speed visual simulation. Techniques with which to incorporate moving ground targets into the videodisc scenes have been developed. The system will also be designed so that a variable acuity lens can be used to project an eye-matched dome display. The successful development and integration of this technology could represent a major breakthrough in visual simulation. The nonprocessing intensive nature of the system would allow a major advance in terms of visual scene detail, texture, and realism compared to the computation-bound approach in totally computer-generated imagery systems. The terrain textural fidelity capability inherent in this approach may finally provide realistic simulation of real-world tactical environments.

FOR ADDITIONAL INFORMATION: Contact: Dan McGuire, AFHRL/OTE, Williams Air Force Base, AZ 85224; (502) 988-2611, extension 6561.

PHYSICS

0955 Beam Splitter Introduces Little Aberration: Placing a beam splitter inside an existing lens minimizes aberrations
National Aeronautics and Space Administration,
Washington, DC.
Apr 84 *(J)*

A beam-splitter prism array 'buried' in a concentric Bouwers corrector lens would introduce only longitudinal chromatic aberration when used in the converging beam of a Schmidt/Bouwers optical system. The beam splitter makes it possible to form a separate image in each wavelength channel of interest. The proposed beam-splitter takes advantage of a fortuitous characteristic of this particular optical system; namely, that the system already requires a thick lens element where the beam splitter could be placed. Versions of the beam splitter have been devised for dividing the beam into as many as six parts.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15580/TN.

0956 Bidirectional Fiber-Optic Cable Adapter: Two different wavelengths of light are transmitted in opposite directions on a single optical fiber
Army Materiel Development and Readiness Command, Alexandria, VA.
Sep 84 *(B)*

A full-duplex, single fiber-optic link operating in the 1.0 to 1.6 mm region is capable of transmitting 20 Mb/second a minimum distance of 10 km. Developed for the U.S. Army Communications-Electronics Command, the adapter has a proposed mean time between failures (MTBF) of 5000 hours for the link, and it had to operate successfully between 0 and 50C. The system used in the test consisted of two modems and nine cable assemblies totaling 15 km.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A133371/NAA, price code: A04, or contact project officer Claire Loscoe (201) 544-5211.

0957 Boundary-Layer Equations for Two-Dimensional and Axisymmetric Flow: Finite-difference procedure solves for laminar, transitional, or turbulent flows
National Aeronautics and Space Administration, Washington, DC.
Feb 84 *(A, D, J)*

A numerical algorithm, incorporated into the VGBLP computer program, solves the laminar, transitional, or turbulent two-dimensional or axisymmetric compressible boundary-layer equations for perfect-gas flows. In the program, a coupled, iterative implicit finite-difference procedure solves the system of equations for laminar, transitional, or turbulent boundary-layer flows. This program is written in FORTRAN IV for batch execution.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to LAR-13015/TN.

0958 Broadly Tunable Picosecond IR Source: Source produces continuously tunable, high-power radiation in the 10- to 20-micro m band
Department of Energy, Washington, DC.
Oct 84 *(J, K)*

A picosecond traveling-wave infrared (IR) source generates 2-micro J radiation, tunable between 14.8 and 18.5 micro m. This infrared region has received increasing attention in the recent years, principally for optical communications, for the investigation of multiple-photon absorption and vibrational-energy transfer processes in molecules, and for laser fusion. The apparatus incorporates two LiNbO3 crystals positioned in series but separated by a diffraction grating.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,349,907, which is available from: Commissioner of Patents, Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For further information, contact: Ronald C. Hyer, CHM-4, MS J567, Los Alamos National Laboratory, Los Alamos, NM 87545; (505) 667-6710.

0959 Characterizing Aluminum/Gallium Arsenide Semiconductors: Mechanisms of operation are elucidated
Army Materiel Development and Readiness Command, Alexandria, VA.
Sep 84 *(B, J)*

An in-depth study, sponsored by the U.S. Army Research Office, has been conducted on aluminum/gallium arsenide to investigate the electrical, optical, and metallurgical properties of defects in compound semiconductors. The study covers three separate but related areas: defects in annealed Al/GaAs single crystals, electronic transport properties of Al/GaAs semiconductors, and properties of heavily-doped Al/GaAs semiconductors. In the first area, annealing effects were investigated with nondegenerate n-type single crystals that had n-type surface layers formed by annealing at 800 C for 21 hours in vacuum. In the study of electronic transport properties, theoretical models were used to determine the relative contributions of various scattering processes to the total mobility of the charge carriers. The materials used to characterize heavily doped Al/GaAs included nondegenerate Al/GaAs:Te and Al/GaAs:Ge.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A122902/NAA, price code: A02, or contact project officer Horst Wittmann (919) 549-0641.

Charged-Particle Flux Sensor: Improved design has greater collection efficiency
See 0456

0960 Computer Program for Chemically Reactive Fluid Flow: Program solves the equations of transient multicomponent chemically reactive fluid dynamics
Department of Energy, Washington, DC.
Oct 84 *(A, J)*

A computer program has been developed that solves the equations of transient multicomponent chemically reactive fluid dynamics in two space dimensions. Areas of current interest in which reactive flow plays a fundamental role include chemical lasers, industrial burners and furnaces, and internal combustion engines. A report is available which discusses in detail the governing equations, the numerical scheme used to solve them, and the code structure, and a complete listing of the FORTRAN program is provided. A wide variety of fluid-flow problems, with and without chemical reactions, evaporating liquid sprays, or moving boundaries can therefore be modeled with the program.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-017385/NAB, price code: A10. For information not provided in the report, contact L.D. Cloutman, Los Alamos National Laboratory, MS-216, Los Alamos, NM 87545; (505) 667-4156.

0961 Controlling Metal-Halide Vapor Density in Lasers: Streams of buffer gas convect and dilute the metal-halide vapor
National Aeronautics and Space Administration, Washington, DC.
Oct 84 *(J)*

The energy per pulse and peak power per pulse of a copper-halide or other metal-halide laser depend upon the vapor density inside the laser tube. A new technique uses the flow of buffer gas through the reservoir, which contains heated metal halide, to convect the vapors into the discharge tube. A second stream of buffer gas dilutes the vapor. The final vapor density in the laser tube is controlled and changed by adjusting either one or both of the buffer-gas flow rates.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning license for its commercial development should be addressed to Paul F. McCaul, NASA Resident Office-JPL, Mail Code: 180-601, 4800 Oak Grove Drive, Pasadena, CA 91103; (213) 354-2700. In either case refer to NPO-15021/TN.

0962 Determining Crystal Orientation by Laser Diffraction: Rapid, accurate method employs inexpensive equipment and requires minimal sample preparation

Department of Energy, Washington, DC.

Oct 84 *(J, K)*

An optical diffraction method determines the crystal orientation of solid samples. The method is designed for applications requiring precise crystal alinement, as for example, in the manufacture of semiconducting wafers for photovoltaic solar cells or in the manufacture of crystal oscillators. The method is also suitable for characterizing polycrystalline silicon substrates with small grain size, used in the fabrication of solar cells. The technique involves two steps: (1) texture etching the surface of the crystal sample and (2) illuminating the treated surface with a laser to produce a far-field diffraction pattern in the reflection.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PAT-APPL-6,376,088/NAB, price code: A03. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For additional information, contact: B. L. Sopori, Solavolt, P.O. Box 2934, Phoenix, AZ 85062; (602) 231-6513.

Determining the Point of Zero Zeta Potential in Solid Samples: In a new technique, the sample does not have to be in powder form

See 0467

Directional Fluid-Flow Transducer: A probe with strain gages detects lateral fluid force

See 0473

Discriminating Between Liquid and Gas Flows: Variations in momentum density would change the position of a sensor

See 0474

0963 Effect of Temperature on Fiber-Optic Delay: Fiber/jacket interactions affect performance

National Aeronautics and Space Administration, Washington, DC.

Oct 84 *(C)*

Attenuation and phase measurements have been made to assess the effect of temperature on signal delay and attenuation in two fiber-optic cable samples. The signal source was a laser diode operating at a carrier wavelength of 0.817 microns. Loose-tube fiber cables are therefore considered more stable with respect to temperature.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15148/TN.

Electron Beam Could Probe Recombination Centers: Properties of multilevel deep traps could be investigated

See 0478

Estimating Design Loads in Coupled Vibrating Structures: Approximate spectral analysis is faster and less expensive than transient analysis

See 1001

0964 Fabricating Grating Couplers on Optical Fibers: Microscopic corrugations are formed on fiber surfaces

National Aeronautics and Space Administration, Washington, DC.

Apr 84 *(B, J)*

Recent experiments show the feasibility of incorporating diffraction gratings into the surfaces of thinly-clad optical fibers. Grating couplers would couple signals into and out of single-mode optical waveguides without requiring precise alinement of the components, although their in-service efficiency has yet to be verified. Coupling is most efficient when the grating is close to the fiber core. Therefore, before forming the surface grating, a portion of the fiber cladding must be removed. This can be done by mechanical polishing to form a flat grating substrate or by chemical etching to form a thin cladding as a substrate for a grating that extends all the way around the fiber. The grating is scribed holographically.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20286/TN.

0965 Flow of Non-Newtonian Liquids After Impact: Nonideal viscoelastic properties speed up spreading of drops on surfaces

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 84 *(J)*

To ensure that drop sizes in an atomized liquid are large (1 to 3 millimeters) so that evaporation is not significant, polymers can be added to the bulk liquid. The polymer, however, affects the breakup of the drops when they impinge on a solid surface. A report presents the results of a study of the spreading of such non-Newtonian drops on smooth surfaces. The study evaluated theoretically how the non-Newtonian properties affect drops. The spread rates and size doubling times were numerically calculated. In addition to spreading on a horizontal surface, spreading on a tilted surface was examined in the study, which was conducted for the U.S. Army Armament Research and Development Command.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A135543/NAA, price code: A04, or contact project officer Paul Fedele (301) 671-2262.

0966 Flow Over Nonaxisymmetric Nozzles: Code solves three-dimensional Navier-Stokes equations

National Aeronautics and Space Administration, Washington, DC.

Apr 84 *(A, D, J)*

A set of computer codes solves the three-dimensional Navier-Stokes equations for the flow over nonaxisymmetric nozzles. These codes compute the internal and external viscous flowfield about an isolated nozzle, so that the flow characteristics and performance of three-dimensional jet engine exhaust nozzles can be predicted. The approach is based on using an efficient implicit numerical method to solve the unsteady Navier-Stokes equations in a boundary-conforming curvilinear coordinate system to obtain the desired time-asymptotic steady-state solution. These programs are written in FORTRAN IV and ASSEMBLER.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to LAR-12962/TN.

0967 Fluidics -- Basic Components and Applications: Report highlights the applications of fluidics for home, industry, medicine, and aerospace

Army Materiel Development and Readiness Command,
Alexandria, VA.
Sep 84 *(D)*

A pulsating shower head that massages the bather and a lawn sprinkler that oscillates in response to fluid pressure are two of the consumer applications of fluidics, a technology that is experiencing increasing growth in both commercial and defense industries. For anyone interested in a short yet complete description of fluidics and some of its many applications, a report prepared by the Harry Diamond Laboratories is available. Using clear diagrams and simple language, the report quickly familiarizes people from other disciplines with the basic components of fluidics -- sensors, amplifiers (see figure), and interface devices. Because these components have no moving parts, they are highly reliable. This and their low cost and tolerance to shock, vibration, temperature, altitude, and radiation have prompted their selection over electronic and mechanical control systems.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A134046/NAA, price code: A02, or contact project officer Phillip Emmerman (202) 394-3080.

0968 Fluorine Mixer/Vaporizer for Chemical Lasers: The fluorine is vaporized by a flow of helium

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(J)*

A mixer/vaporizer chamber gasifies liquid fluorine before it is injected into the lasing cavity of a hydrogen fluoride/deuterium fluoride laser. The fluorine is vaporized by a flow of helium. Hot helium gas is injected into the chamber and the liquid fluorine is introduced into the chamber as droplets. Because the laser already uses helium to absorb heat, the addition of hot helium to vaporize the liquid fluorine does not affect the subsequent use of the fluorine.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15552/TN.

Focusing X-Ray Monochromator for Synchrotron Radiation
See 0485

0969 Forming Mirrors on Composite Materials: Smooth coatings are deposited on hard-to-polish substrates

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(G, H)*

A strong, lightweight mirror is produced by depositing a coating of polyester resin on a carbon/carbon or graphite/epoxy composite structure. (The resin coating, which is made smooth by the replication of a smooth glass surface, forms a smooth substrate for the metalization.) In the new procedure, a previously fabricated substrate is roughened with sandpaper and cleaned. A layer of polyester resin mixed with its catalyst is applied to the substrate and covered with a piece of smooth glass that has been previously cleaned and coated with a silicone-oil release agent. After the resin has cured, the glass is lifted, leaving a smooth polyester surface. The surface is then coated with a metallic reflective layer of aluminum or silver by vacuum evaporation. A protective, transparent plastic coating can be applied for durability.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15912/TN.

0970 Gallium Arsenide Waveguide for Light: Molecular-beam epitaxy creates a structure having controllable properties

Army Materiel Development and Readiness Command,
Alexandria, VA.
Jan 84 *(J)*

A report presents the results of experimental analyses of the electronic and optical properties of an optical waveguide composed of gallium arsenide. The gallium arsenide waveguide was made by molecular-beam epitaxy, in which a variety of atoms or molecules are deposited as a film having the same crystal structure as its substrate. The analyses were conducted by the U.S. Army Armament Research and Development Command. Although molecular-beam epitaxy is still an emerging technology, the experiments showed that it can be used to form high-quality waveguide structures for carbon dioxide lasers.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A117394, price code: A02.

Glass Ceramics, Shape Memory, and Ferroelectric Materials: Report presents three results from materials studies
See 0784

Growing Crystals for Infrared Detectors: Unidirectional solidification yields bulk crystals with compositional homogeneity
See 0489

Highly Stable Lasers for Precision Tests Developed
See 0492

0971 Improved Coil for Hydrogen Dissociators: The flat coil has a rigid printed-circuit substrate

National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(B, J)*

A printed-circuit substrate provides a rigid support for the flat spiral coil used to apply a radiofrequency (RF) field to a hydrogen plasma. Coupling coils for hydrogen dissociators must be supported mechanically to withstand vibration and shock. The new coil structure also minimizes the RF electric field near the glass walls of the plasma vessel and therefore reduces direct electron bombardment of the glass. The design lends itself well to high production and standardized dimensions.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for the commercial use of this invention should be addressed to Leon D. Wofford, Jr., George C. Marshall Space Flight Center, Mail Code: CC01, Marshall Space Flight Center, AL 35812; (205) 453-0020. In either case refer to MFS-25638/TN.

0972 Improved Cooling System for Organic Dye Lasers: Complexity and expense are substantially reduced

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 84 *(J)*

A modification to the cooling system of flashlamp-pumped organic dye lasers has been found to be very effective in reducing the complexity of the system while improving the performance of the laser. The modification, developed and tested for the U.S. Army Armament Research and Development Command, eliminates a precision temperature controller, which required high maintenance and expense. Previously, organic dye lasers, which used a flashlamp to excite the active medium, required two separate temperature-controlled cooling loops. The modification consists of rerouting the piping to convert the two loops into one large loop and removing the temperature controllers completely..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A128037/NAA, price code: A02.

0973 Improved Heavy-Ion Linac: Radio-frequency quadrupole linac biomedical and nuclear research potentials

Department of Energy, Washington, DC.

Dec 84 *(J)*

Two design requirements have been fulfilled at once by a radio-frequency quadrupole (RFQ) linac that was developed and tested at the Lawrence Berkeley Laboratory. The linac can be applied as a dedicated heavy-ion biomedical accelerator or as an upgrade of the Bevatron local injector with capability extended to atomic mass number 40. The heart of the system is a 200-MHz RFQ structure designed for ions with a charge-to-mass ratio as low as 0.14. Compactness, simplicity, economy, and reliability are among the number of advantages this system offers over the conventional injectors.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-004192/NAB, price code: A02.

Improved Laser Velocimeter: It can monitor fluid motion in three dimensions
See 0494

Instrument Measures Airflow Friction Without Contact: A laser interferometer monitors the thickness of a shearing oil film
See 0501

Isolating Supports for X-Ray Mirrors: Simple concept reduces effects of gravity, temperature, and magnetism
See 0502

Lensless Scanning Telescope: Proposed dual-aperture device minimizes aliasing
See 0506

0974 Low-Temperature Laser-Rod Holder: Fragile laser rod is protected from thermally-induced mechanical stress

Department of Energy, Washington, DC.

Mar 84 *(J, K)*

A new holder maintains the position of a holmium/yttrium/lithium-fluoride laser rod that must be cycled between room temperature and the operating temperature of 70 to 80 K. The rod is delicate and brittle, requiring a mounting that minimizes thermally-induced mechanical stresses. Its modulus of rupture is only 33 MPa. The rod-housing components are selected to minimize thermal-expansion differences among critical parts..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-013604, price code: A02. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. DOE, Washington, DC 20585.

Magnetohydrodynamic Analogy Instrument Tests Supersonic Flows
See 0512

Measuring Diffusion and Recombination in Polycrystalline Silicon: Light-beam-induced currents yield information about solar-cell material
See 0354

Measuring Excess Noise in SDL's: A simple system measures noise deviation in semiconductor-diode lasers
See 0516

Measuring Small Leak Holes: Hole sizes are deduced from pressure measurements
See 0521

Measuring Surface-Shear Stress in a Wind Tunnel: Two-wire skin-friction gage gives both magnitude and direction of mean and fluctuating stresses
See 0523

Measuring Ultrasonic Shear-Wave Velocity: A technique using a reference sphere increases accuracy
See 0526

Measuring Wide-Range Gas Flow: Accurate readings are made of flows ranging over three orders of magnitude
See 0527

Mixed Conduction in Semi-Insulating Gallium Arsenide: A new analytic technique allows more accurate calculations
See 0530

0975 Multiple-Image Holographic Matched Filter: New technique for making holograms greatly increases storage density

Army Materiel Development and Readiness Command, Alexandria, VA.

May 84 *(J)*

A new method for making matched filters that can store multiple images offers higher storage density than that available from the conventional holographic matched filters. The basic principle of this method, which was developed for the U.S. Army Missile Command, is to record the zero-order Fourier-transformed holographic images one at a time at an array of locations at the Fourier plane or matched-filter plane. The center location of each hologram is determined according to the centers of the spectrum islands of the Fourier transform of a contact screen.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A118430, price code: A02 or contact project officer J.C. Duthie (205) 876-3820.

0976 Multiple-Wavelength Metal/Halide Laser: A single device produces multiple lasing lines

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(J)*

A laser capable of producing many lasing lines has several reservoirs of halide lasant mixed with the chlorides of copper, manganese, and iron. Existing metal/halide systems, in contrast, produce significant energy output at only one or two transitions. In the new laser, each of the separately heated reservoirs contains a single halide. The vapor density of the individual halides is controlled by a metered flow of neon carrier gas. A convection-control technique makes it possible to rapidly change from one metal halide to another at maximum energy.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15256/TN.

0977 Multivalued-Velocity-Field Model of Turbulence: The origin and propagation of vortexes are analyzed

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(D, J)*

A recent report presents a multi-valued-velocity model to be used in calculations of turbulence formation. Developed as part of a continuing study of turbulent fluid motion, the model is expected to evolve into a comprehensive mathematical tool to explain the origin and effects of turbulence. Interest should be widespread: A reliable turbulence model would have great theoretical and practical value in such fields as aerodynamics, meteorology, and combustion.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15748/TN.

National Laser Users Facility: Experiments in High Energy-Density Physics
See 0938

New Hydraulic Analogy Instrument Tests Gasdynamic Flows
See 0537

New Interferometer System Developed For Field Testing of Large Mirrors
See 0538

0978 New Method of Joining Optical Fibers Is Developed

Department of Health and Human Services, Washington, DC.
Apr 84 *(B, K)*

The U.S. Department of Health and Human Services has developed a method of joining plastic optical fibers. This method fuses fiber ends to form connections between two or more optical fibers in a side-by-side and/or an abutting relationship. In designing fiber optic sensors, researchers desired a method of joining plastic optical fibers directly. In typical PO2 probes, the terminal ends of two fibers are positioned in side-by-side parallel alignment so that excitation light enters the probe from one fiber and luminescent light from the probe passes into the other fiber. Researchers have discovered improved performance can be achieved if the fiber ends are physically joined together rather than merely held side-by-side. The advantage of this new method is that it offers side-by-side connection of two or more plastic optical fibers by fusion of the fiber ends.

FOR ADDITIONAL INFORMATION: Contact: Office of Government Inventions and Patents, National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161; (703) 487-4732, refer to Patent Application 6-509-819/TN.

Normal-Incidence Soft-X-Ray Mirror: A multilayered interference structure has about 6 percent reflectivity
See 0540

0979 Obtaining Pulses From a CW Laser: Two acousto-optic modulators operate in tandem

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(J)*

A proposed system would generate pulses from the output of a continuous-wave laser. The duration and repetition rate of the pulses could be controlled. The laser beam is fed through an acousto-optic modulator, which is driven by a sum of harmonically related frequencies and which diffracts portions of the beam through small angles and shifts these diverging waves through frequencies equal to the frequencies of the traveling acoustic waves. The diverging waves are recombined into a parallel output beam in a second modulator that is driven by the same signal source that drives the first one.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to Paul F. McCaul, NASA Resident Office-JPL, Mail Code: 180-601, 4800 Oak Grove Drive, Pasadena, CA 91103; (213) 354-2700. Refer to NPO-15111/TN.

0980 Obtaining Runge-Kutta Solutions Between Time Steps: A new interpolation method is used with existing Runge-Kutta algorithms

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(J)*

Scaled interpolation algorithms have been developed for use with third-through fifth-order Runge-Kutta algorithms. The interpolation algorithm evaluates a solution at an intermediate point within an integration step. Only a few additional computations are required to produce the intermediate solution data.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: NASA-TM-58239/NAC, price code: A05.

Optical Coupler/Decoupler Communication Module: Design uses efficient, high-resolution-wavelength multiplexer
See 0186

Optical-Fiber-to-Channel-Waveguide Coupler: A holding device is made by etching V-shaped grooves in silicon
See 0275

0981 Overview of Materials At Low Temperatures
Department of Commerce, Washington, DC.
Feb 84 *(H, J)*

National Bureau of Standards researchers have collaborated on a comprehensive overview of the properties, behavior, and applications of materials used at cryogenic temperatures. A 570-page book describes the electrical, mechanical, magnetic, thermophysical, and elastic properties of structural metals and alloys, conductors and superconductors, composites, and many other materials used at low temperatures. It also discusses martensitic phase transformations, fracture mechanics, compatibility of materials with low-temperature fluids, and the methodology of temperature, strain, magnetic field, critical current, and other measurements.

Poisoning of Semiconductors
See 0544

0982 Polymer Bonding of Optical Fibers: Optical waveguides are coupled through their sides
National Aeronautics and Space Administration,
Washington, DC.
Sep 84 *(G, H)*

In a new optical-waveguide coupling technique, two glass fibers are bonded along their sides with a polymer, rather than coupled at their ends. The method employs no critical optical alinement procedures and eliminates the need for precisely cutting fibers or controlling the high fusion temperature required to weld the fibers together. In the new technique, individual waveguides are bonded together after much of the core cladding is removed along a selected length of both fibers. Coupling occurs where the fibers make contact in the selected region. By varying the length of the coupled region, the amount of coupling is controlled.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for the commercial use of this invention should be addressed to Paul F. McCaul, NASA Resident Office-JPL, Mail Code: 180-601, 4800 Oak Grove Drive, Pasadena, CA 91103; (213) 354-2700. In either case refer to NPO-15464/TN.

A Portable Radiation Monitor: Battery-operated monitor detects and identifies radiation on site
See 0547

Precise Measurement of Effective Focal Length: Computerized instrument measures effective focal lengths to 0.01 percent accuracy
See 0549

Pressure-Reduction Technique for Crystal Growth: Large crystals could be grown by varying the pressure rather than the temperature
See 0129

0983 Pulsed Gas Laser-Pumping System: Higher laser efficiencies are obtained
Department of Energy, Washington, DC.
Nov 84 *(J)*

A pumping system spontaneously circulates the lasing medium in high-energy, repetitively pulsed gas lasers. Previously, such lasers required mechanical pumps to circulate the gas, resulting in the need to employ acoustic suppressor and absorber elements in the laser cavity to obtain uniform and quiescent gas supplies for lasing. The spontaneous circulating system consists of a closed loop within the laser system containing an inlet and exhaust chamber located at the ends of the laser cavity. A pair of high-speed gas valves are positioned at the ends of the cavity and connected to a timing-control unit. A pressure wave generated following a lasing pulse travels down the cavity toward the exhaust chamber. With the opening of the inlet valve, the expansion wave enters the chamber drawing fresh gas into the cavity. Both valves then close with the new gas in the cavity for the next pulse.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,360,922, which is available from: Commissioner of Patents, Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For further information, contact: R. H. Cobbs, Manager, Classification Management, Electronics and Defense Sector, TRW Inc., One Space Park, Redondo Beach, CA 90278, (213) 536-1928.

0984 Random Life Curves for Common Engineering Materials: Program incorporates non-Rayleigh effects in evaluating structure life
National Aeronautics and Space Administration,
Washington, DC.
Jun 84 *(A, D)*

The RMS2 computer program converts constant-amplitude fatigue allowables to random-loading allowables, with the influence of peak distribution and mean stress considered. RMS2 has been used in the random-loading fatigue analyses of the Shuttle orbiter structure. Goodman stress-vs.-cycle for 30 common engineering materials are built into the program. These data may be modified or new materials added as needed. Standard input to RMS2 consists of a material code, an upper limit of the root-mean-square stress to be used in the life curve, the mean stress value in consideration, the stress concentration factor, the ultimate strength (if known), and the peak distribution parameter. RMS2 is written in FORTRAN IV for batch execution.

FOR ADDITIONAL INFORMATION: Contact: Computer software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to MSC-20433/TN.

Rare Earth/Cobalt Permanent Magnets: Magnets allow significant simplifications in circuit design
See 0285

Report Reviews Prediction Of Microwave Attenuation By Rainfall
See 0189

0985 Reproducible Mirror-Finish Metal Surfaces: Method produces highly reflective metal surfaces
Department of Energy, Washington, DC.
Nov 84 *(G)*

A fabrication method produces metal surfaces that are extremely smooth and have high optical reflectivity. Developed for forming a mirror finish on the inside surfaces of cones, the method is also suitable for flat or curved surfaces. In fabrication of conical mirrors, an aluminum mandrel is electroless-plated with a 10-mil layer of nickel. The plated mandrel is diamond-machined to obtain a smooth, highly reflective nickel surface. A cone can now be formed on the mandrel. After passivation, the mandrel is placed in a nickel-electroplating solution to allow another layer of nickel to build up on the mandrel.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent

4,374,002, which is available from: Commissioner of Patents, Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For further information, contact: Philip J. Steger, Martin Marietta Energy Systems, Inc., P.O. Box Y, Building 9998, MS 001, Oak Ridge, TN 37831; (615) 574-1860.

0986 Scanning XeCl Laser: Potential applications of the narrow-bandwidth laser include remote sensing and high-resolution spectroscopy

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(J)*

A scanning XeCl oscillator/ring-laser amplifier produces a narrow spectral bandwidth (<0.003 nm) over a tuning range of 307.5 to 308.5 nm. The ring configuration has the following advantages: (a) The oscillator is decoupled from the amplifier, (b) the output is unidirectional, (c) the output beam is uniform, and (d) the inexpensive optics allow variable output coupling and cavity length. Fluorescence excitation spectra of OH radicals produced in a methane/oxygen flame were recorded using the new laser. Other potential applications include remote sensing of atmospheric OH radicals, chemical processing, isotope separation, and high-resolution spectroscopy.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15692/TN.

0987 Secondary-Spectrum-Free Lens System: Inclusion of a calcium fluoride element allows all aberrations to be reduced to insignificant levels

Department of Energy, Washington, DC.
Sep 84 *(J, K)*

A lens system combining a calcium fluoride optical element with ordinary crown-glass lens elements greatly reduces secondary spectrum (residual color errors). Glass specifications are critical because glasses within the ranges have the ability, when used with calcium fluoride, to reduce the secondary spectrum and spherochromatism to very small values and at the same time to correct all other lens aberrations. The longitudinal range of the smallest image positions (directly related to classical spherochromatism) is 1 part in 230,000. This value is beyond the ability of conventional lens fabrication.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,349,249, which is available from: Commissioner of Patents, Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For further information, contact: B. B. Brixner, 1342 46th Street, Los Alamos, NM 87544; (505) 662-2973.

0988 Shock-Free Airfoil Cascades: Fast design and analysis uses fictitious gas concept

National Aeronautics and Space Administration,
Washington, DC.
Apr 84 *(A, D)*

The CAS22 computer program was developed to provide for the fast design and analysis of shock-free airfoil cascades. CAS22 is applicable to the aerodynamic analysis and transonic shock-free redesign of existing two-dimensional cascades of airfoils. CAS22 can be used in three separate modes of operation: As an analysis code for full-potential, transonic, shocked or shock-free cascade flows; As a design code for shock-free cascades that uses Sobieczky's fictitious gas concept; and As a shock-free design code followed automatically by an analysis to confirm that the newly obtained cascade shape provides for an entirely shock-free transonic flow field. The program is written in FORTRAN IV for batch execution and has been implemented on an IBM 370 series computer with a central memory requirement of approximately 315K of 8-bit bytes.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to LEW-13842/TN.

0989 Simplified Laser Tuning: Tuning arrangement employs a single grating and two planar mirrors

National Aeronautics and Space Administration,
Washington, DC.
Oct 84 *(J)*

An arrangement of front-surface mirrors and a single holographic grating significantly reduces the spectral bandwidth and simplifies the tuning of a laser output. The laser can be used to induce fluorescence in measuring concentrations of trace species, such as the OH radical, in the atmosphere. The grating is used in both grazing incidence and Littrow orientations. By using a suitable grazing angle, an incident laser beam illuminates more of the grooves of the grating. The diffracted beam is expanded only in one dimension, simplifying the alinement of tuning optics and allowing for the use of a long, thin grating that is both inexpensive and compact.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for the commercial use of this invention should be addressed to Paul F. McCaul, NASA Resident Office-JPL, Mail Code: 180-601, 4800 Oak Grove Drive, Pasadena, CA 91103; (213) 354-2700. In either case refer to NPO-15690/TN.

Simplified Modeling of Tetrahedral Trusses: Models reduce the time and cost of structural analyses

See 0155

Stability of Tube Rows in Crossflow: Two instability mechanisms are identified in heat-exchanger tube bundles

See 0369

0990 Stability Test for Transient-Temperature Calculations: A graphical technique gives a rapid indication of stability or instability

National Aeronautics and Space Administration,
Washington, DC.
Dec 84 *(H, J)*

A graphical test helps assure the numerical stability of calculations of transient temperature or diffusion in a composite medium. With the help of the test, the time increment is chosen small enough to keep the numerical error from growing out of bounds yet as large as possible within the stability limit to minimize the calculation time. The medium may be homogeneous or divided into regions with different specific heats and heat conductivities. For simplicity, media interfaces lie along lines of rectangular grid points.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25803/TN.

0991 Steady, Nonrotating, Blade-to-Blade Potential Transonic Cascade Flow Analysis Code: Program numerically solves an artificially time-dependent form of the actual full-potential equation

National Aeronautics and Space Administration,
Washington, DC.
Nov 84 *(A, D)*

An exact, full-potential-equation model and appropriate boundary conditions have been derived for the steady, irrotational, homoentropic, and homoenergetic flow of a compressible, inviscid fluid through a two-dimensional planar cascade. The CAS2D computer program numerically solves an artificially time-dependent form of the actual full-potential equation, providing a steady, nonrotating, blade-to-blade potential transonic cascade flow analysis code. Comparisons of results with test data and theoretical solutions indicate very good agreement.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602; (404) 542-3265. Refer to LEW-13854/TN.

Submillisecond Optical Knife-Edge Testing: Data are sampled much faster than the optical system drift rate
See 0565

Superconducting High-Magnetic Field Lab Pays Off
See 0567

0992 Superconducting Wire With Improved Strain Tolerance: Winding stresses have a less adverse effect on current-carrying capacity

Department of Energy, Washington, DC.
Feb 84 *(G, H)*

A slight alloying addition improves the tolerance of matrix/filament type super-conducting wires to the tensile and compressive stresses of winding and operation. In a wire made by the improved method, the filament is biased to a state of moderate compression that maximizes the critical current and decreases the susceptibility of the wire to a stress-induced degradation of the critical current.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,343,867, which is available from: Commissioner of Patents, Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, US DOE, Washington, DC 20585.

0993 Swirl Diffuser: A gas diffuser, based on swirling flow, dissipates the incoming gas velocity in a relatively short distance

National Aeronautics and Space Administration,
Washington, DC.
Jul 84 *(D)*

By creating a swirling flow, a gas diffuser dissipates incoming gas velocity rapidly and quietly so that the gas enters a tank without disturbing the gas in it. Possible applications for the diffuser would be in fuel burners, in room inlets for heating and air-conditioning, and in carburetors for internal-combustion engines. The swirl diffuser includes an inlet pipe, a pinwheel (swirl) nozzle, and a can. The pinwheel nozzle creates a flow that swirls along inside the length of the can and then spins out of the open end into the tank. The diffuser rapidly dissipates velocity without the pressure drop associated with a chamber.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-18996/TN.

System Measures Low-Level Laser Pulses
See 0569

0994 Thermal Modeling of Bridgman Crystal Growth: Heat flow is modeled for a moving or stationary rod-shaped sample inside a directional-solidification furnace

National Aeronautics and Space Administration,
Washington, DC.
Aug 84 *(A, J)*

In the design of vertical Bridgman directional-solidification experiments, it is important to be able to predict the thermal profiles in the specimen. A computer program for the one-dimensional thermal modeling of Bridgman crystal growth provides an approximate analytical solution. The solution may be used as a guide for numerical modeling in more-comprehensive thermal-analysis programs and for designing experimental procedures. It is useful for predicting thermal gradients, estimating solidification interface position, and analyzing the effects of sample translation and sample insertion length. This program is written in BASIC and has been implemented on an HP9835 computer with a central-memory requirement of approximately 18K of 8-bit bytes.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to MFS-27003/TN.

0995 Thermal Radiation Model Renodalization: Simplified radiation models reduce programing cost

National Aeronautics and Space Administration,
Washington, DC.
May 84 *(E, J)*

The Thermal Radiation Model Renodalization program redefines a thermal model nodal geometry subsequent to generation of radiation interchange data. Previously, the geometry of a radiation model had to be identical to, or possibly more complex than, the thermal analyzer model. This renodalization program allows a radiation model to be much different from, even less detailed, than the thermal analyzer model. Thus, radiation models may be greatly simplified in many applications to reduce computer cost. This program is written in FORTRAN V for batch execution.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to MSC-20348/TN.

Thermoelectric Heat-Flux Gage: Simple device yields accurate results
See 0573

0996 Time-Domain Modal Vibration Identification: Natural frequencies, damping factors, and damped mode shapes are identified

National Aeronautics and Space Administration,
Washington, DC.
Feb 84 *(A, D)*

The Ibrahim Time-Domain modal vibration identification program (ITD) uses multiple free-decay responses of a test structure directly in the time domain to identify the modal parameters of the structure, the natural frequencies, the damping factors, and the damped mode shapes. When only random response data are available, the program first estimates the required free-decay response functions using the multiple channel random-decrement technique. ITD is written in FORTRAN IV for batch execution.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to LAR-12924/TN.

0997 Tuning System for High-Power CO2 Lasers: Problems associated with unstable resonators are minimized

Department of Energy, Washington, DC.

Sep 84 *(J, K)*

A tunable, unstable-resonator system has been developed for high-power, narrow-line CO2 pump lasers. Conventional unstable resonators that can deliver higher energies than stable resonators have not been used as far-infrared pump lasers because of the intermixing of spherical and planar waveforms, which makes tuning difficult. This system enables direct-line tuning by effecting separation of the two different waveforms. The tuning system consists of an array of reflectors arranged in a ring configuration. The plane grating, which is formed with vertical grooves, receives light from the concave collimating mirror and directs only planar waves to a relay mirror located off axis.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,361,889, which is available from: Commissioner of Patents, Washington, DC 20231 for $1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For further information, contact: Dr. Larry C. Johnson, Princeton University, Plasma Physics Laboratory, P.O. Box 451, Princeton, NJ 08544.

0998 Vibration Analysis Reduces Computer Time: Calculation cost is reduced without loss of accuracy

National Aeronautics and Space Administration, Washington, DC.

Feb 84 *(A, D)*

An improved calculation method promises to reduce computer time by a factor of 10 for vibration analysis of complex structures. The method was originally developed to predict the mechanical response of a spacecraft to maneuvers in various cases in which the same booster is used with different payloads. Many nonaerospace applications are possible whenever major components of a system remain the same while some are varied. These include the design of vehicles and the design or modification of floors, walls, and structural modules. The method is more exact than conventional normal-mode methods in that it involves no initial approximations or assumptions. The method is readily adaptable to short cuts.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25711/TN.

Vibration-Isolation Bench for Testing in Vacuum: Precise optical systems can be tested without contamination
See 0584

X-Ray Detector for 1 to 30 keV: Array of deep silicon cells can be used for imaging or spectroscopy
See 0588

X-Ray Diffraction Polarization: Polarization ratios are key factors in applying X-ray diffraction methods for accurate analysis of materials
See 0589

SPACE TECHNOLOGY

0999 Bacteria Count Photometer is Developed

National Aeronautics and Space Administration, Washington, DC.

Nov 84 *(E, K)*

Photometer technology for the detection of life on other planets was developed by the NASA Goddard Space Flight Center. The Bacteria Count Photometer is capable of accurate measurement of bacteria present in fluids. The basis of the technology is the reaction between two substances, adenosine triphosphate and luciferace. The bacteria count technique involves the introduction of luciferace to a fluid sample and the observation of the light output using a photometer. The production of light indicates the presence of bacteria and the intensity of the light output is a measure of the bacteria count. Use of the photometer measurement technique is simple and fast. Nominal time for sample preparation and bacteria count measurement averages less than ten minutes. Bacteria count results are read from a numerical readout display on the specialized photometer. This bacteria measurement technique has been used successfully in both medical and non-medical applications. Body fluids such as blood, urine and spinal fluid are easily evaluated using this simple process. Non-medical application of this technology include analysis of activiated sewage sludge, study of food contamination, fresh and ocean water analysis, and biological process control for food and beverage production.

FOR ADDITIONAL INFORMATION: Contact: TECTRA fact sheets, School of Business and Public Administration, California State University, Sacramento, CA 95819; (916) 454-6640. Refer to TECTRA-CASE-A13-20/TN.

1000 The Design of Lightning Protection: Engineering study could guide the design and monitoring of lightning protection

National Aeronautics and Space Administration, Washington, DC.

Jan 84 *(B, D)*

Severe environmental conditions, including hurricane-force winds and a corrosive seacoast atmosphere, as well as the need for a 10-year system lifetime were taken into account when refitting and transferring an existing lightning protection system to the Space Shuttle service and access tower. Engineering design studies for this project have been collected in a 150-page report. It contains a wealth of information both on the design of lightning protection systems and on instrumentation for monitoring the current waveforms of lightning strokes. Also included are the results of examinations of the components of the earlier system that had successfully sustained a direct lightning strikes.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: N81-31227, price code: A08.

1001 Estimating Design Loads in Coupled Vibrating Structures: Approximate spectral analysis is faster and less expensive than transient analysis

National Aeronautics and Space Administration, Washington, DC.

Sep 84 *(D)*

A method of vibration analysis combines the separate modes of a spacecraft and its launcher to determine approximate conditions for resonance. The method would be useful for the analysis of any complex structure made up of substructures that are not coupled too closely; however, it is important to note that the method includes the effect of dynamic impedance between the launcher and the payload. The new method is an alternative to transient analysis. The use of modal shock spectra, rather than interface degrees-of-freedom shock spectra, is significant because it automatically accounts for the matching of all interface physical degrees of freedom.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-14872/TN.

1002 Inflatable Rescue Capsules: Rescue spheres transfer people from a disabled vehicle to a rescue vehicle

National Aeronautics and Space Administration, Washington, DC.

Dec 84 *(D)*

A rescue capsule used to transfer Shuttle personnel to a rescue vehicle in an emergency may have terrestrial or underwater applications. The container, an inflatable sphere, is constructed of gastight thermal-protective fabric to provide protection during the transfer. It is equipped with a self-contained air supply. The rescue capsules can be transferred between vehicles using tow lines. When not in use, the rescue spheres are deflated.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25677/TN.

Isolating Supports for X-Ray Mirrors: Simple concept reduces effects of gravity, temperature, and magnetism

See 0502

Large-Scale Software Management System: Changes are organized and controlled according to consistent procedures

See 0208

Lensless Scanning Telescope: Proposed dual-aperture device minimizes aliasing

See 0506

1003 Methods for Estimating Payload/Vehicle Design Loads: Several methods are compared with respect to accuracy, design conservatism, and cost

National Aeronautics and Space Administration, Washington, DC.

Nov 84 *(D)*

A report presents a survey of earlier reports on methods for estimating the dynamic loads on payload support members in the Space Shuttle. The objective of the survey is to reduce the time and expense of load calculation by selecting an approximate method that has sufficient accuracy for the problem at hand. Described in the report are methods for obtaining upper bounds to the dynamic loads on support members and for calculating actual transient time histories of loads. These methods are generally applicable to dynamic-load analysis in other aerospace and other vehicle/payload systems. References are given to other reports that describe the individual methods in detail.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15550/TN.

Minimizing Vibrations While Orienting Large Structures: Control algorithm times thrustor pulses to minimize vibrations

See 0271

1004 Monte Carlo Investigation of Trajectories: Orbital sequences are modeled, simulation statistics generated, and user-requested variables scanned

National Aeronautics and Space Administration, Washington, DC.

May 84 *(A, J)*

The Monte Carlo Investigation of Trajectory Operations and Requirements (MONITOR) program performs spacecraft mission maneuver simulations for geosynchronous, single-maneuver, and comet-encounter trajectories. The MONITOR program is multifaceted. It models various orbital sequences and missions, generates Monte Carlo simulation statistics, and parametrically scans user-requested variables over specified intervals. The program is written in FORTRAN IV for batch execution and has been implemented on an IBM 360-series computer with a central memory requirement of approximately 255K of 8-bit bytes.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to GSC-12705/TN.

1005 Photographic Film Tested on Space Shuttle Flights

Department of the Navy, Washington, DC.

May 84 *(J, K)*

Scientists at the Naval Research Laboratory (NRL) are studying how special photographic films are affected by conditions within the cargo bay of the space shuttle. This program was initiated as a result of film studies conducted at NRL in which a number of factors contributing to the degradation of vacuum-ultraviolet-(VUV) sensitive film were identified. Because it does not have a protective gelatine coating, VUV-sensitive film is sensitive to the gaseous environment in which it is used. Film degradation can seriously compromise a scientific experiment using it for a recording medium. Using information obtained from shuttle test samples, the NRL research team will develop procedures for handling and packaging the film to ensure it will give the best results possible.

FOR ADDITIONAL INFORMATION: Contact: Navy Domestic Technology Transfer Fact Sheet, Code E411, Naval Surface Weapons Center, Dahlgren, VA 22448. Refer to 090101.

1006 Shell-Tile Thermal-Protection System: Upper and lower interlocking caps enclose flexible lightweight insulation

National Aeronautics and Space Administration, Washington, DC.

May 84 *(D)*

A durable shell-tile thermal-protection system, originally developed for the outer surface of reusable Earth-to-orbit transports, consists of interlocking upper and lower hard caps, incorporating appropriate stiffeners and enclosing lightweight fibrous insulation. It is anticipated that the new shell tile will be more durable than the reusable surface insulation (RSI) currently used on the Space Shuttle orbiter. The tiles can be fabricated in almost any shape.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: LAR-12862/TN.

Shuttle Communications Blackout Study: The RF power loss through a three-dimensional plasma sheath is computed
See 0190

1007 Shuttle Inventory Management: All supply activities and requirements are controlled from a single point
National Aeronautics and Space Administration, Washington, DC.
Mar 84 *(A)*

The Shuttle Inventory Management System (SIMS) consists of a series of integrated support programs providing supply support for both the Shuttle program and Kennedy Space Center base operations. SIMS controls all supply activities and requirements from a single point. It employs a system design concept with a large-scale data-base environment controlled by a transaction-driven, automated inventory-control system. A management-by-exception approach allows SIMS to handle the central inventory control of spare and repair parts, supplies requisitioning, and requisition statusing performed by an array of decentralized supply points. The SIMS programs are written in COBOL for integrated batch and interactive execution.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to KSC-11219/TN.

TRANSPORTATION

Coaxial Pipe for Liquid Natural Gas: System provides ultrareliable protection against leaks
See 0604

1008 Containment for Flywheels: R&D is proceeding on low-cost, reliable means for containing the fragments of disintegrating automotive flywheels
Department of Energy, Washington, DC.
Mar 84 *(C, D)*

Some form of containment for a flywheel is essential, but the containment must be both effective and light in weight or it will adversely affect a vehicle performance. A variety of studies have been conducted with the aim of developing improved, inexpensive flywheel containers. For example, an assessment of flywheel-containment technology examined the nature of flywheel-rotor failure. Another study, a state-of-the-art review of flywheel containment, focused exclusively on composite flywheels..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order numbers: UCRL-15261, UCRL-15257, price codes: A07 and A06. For information not provided in the report, contact S. V. Kulkarni, Lawrence Livermore National Laboratory, L-338, Livermore, CA 94550; (415) 422-7128.

Crash Simulation and Nonlinear Structural Analysis: Behavior of structures composed of trusses, frames, and membranes is modeled
See 0006

1009 Dispensing Small Measured Volumes of Liquid: Unit measures, filters, and unloads oil into a container
National Aeronautics and Space Administration, Washington, DC.
May 84 *(D)*

A pressurized dispenser loads a precise quantity of liquid into a vessel. It can be used, for example, in automobile manufacturing to dispense antifreeze solution into radiators or oil into engines, transmissions, or differentials. The dispenser was developed for loading oil into a gearbox on the Space Shuttle solid-rocket booster. It uses gaseous nitrogen to control pressure, flow rate, and quantity precisely, with minimal contamination from the atmosphere. In the new unit, 5 quarts of lubricating oil are placed in a 10-liter pressure-dispensing vessel that is then pressurized to 50 psig.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB83-925405, price code E02.

Dual-Phase Steel for Low-Temperature Application: Study characterizes the suitability of this steel for Arctic-temperature applications
See 0771

1010 Equations for Automotive-Transmission Performance: A curve-fitting procedure ensures high confidence levels
National Aeronautics and Space Administration, Washington, DC.
Nov 84 *(D, F)*

A method for converting test data into equations that describe the performance of automotive transmissions can be used in the design and simulation of cars, trucks, and other vehicles. The equations are applicable to manual and automatic transmissions over a wide range of speed, torque, and efficiency. Raw data obtained from transducers in transmission tests are used to generate equations for power loss as a function of transmission output speed and torque.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15825/TN.

1011 Evaluation of Forklift Trucks: Four different types of forklift trucks are evaluated for productivity and economy
Army Materiel Development and Readiness Command, Alexandria, VA.
Sep 84 *(D)*

A study evaluated the relative merits of 4,000-lb capacity forklift trucks powered by electric, gasoline, liquid-petroleum-gas, and diesel engines. The objective of this analysis, which was performed by the U.S. Army Mobility Equipment Research and Development Command, was to identify costs, productivity, maintainability, and safety of each type of forklift truck so that the user could make a better decision in selecting such trucks for a given facility.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A133629/NAA, price code: A07, or contact project officer James E. Stephens, Jr. (703) 664-1143.

1012 Graphite/Epoxy Tow Bar: Composite bar is as strong as a conventional steel automotive tow bar
Army Materiel Development and Readiness Command,
Alexandria, VA.
Jul 84 *(F, G, H)*

A lightweight, heavy-duty tow bar manufactured from organic composites has been developed. A tow bar weighing 125 lb, versus 340 lb for a standard tow bar, was designed and fabricated from a graphite-reinforced epoxy tube. The bar can withstand loads in excess of 130,000 lb in tension or compression. The tow bar is V-shaped, with a steel lunette at its apex and steel eyes at its ends. The fabrication of the composite tube is a two-part process. A Kevlar, or equivalent, sheath is roll-wrapped into a sheath. Roll-wrapping is a simple, low-cost process that yields a quality part with a dimensionally-controlled inside diameter. Next, the preimpregnated graphite/epoxy is wrapped on an internal mandrel and inserted in the Kevlar sheath.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A130384/NAA, price code: A06, or contact project officer Donald Ostberg (313) 574-5814.

1013 Improved Cattle Hauler: Better aerodynamics and ventilation would increase fuel efficiency and decrease shipping losses
National Aeronautics and Space Administration,
Washington, DC.
Mar 84 *(D)*

Ventilation and temperature control in livestock hauling rigs is improved by a proposed design that incorporates aerodynamic concepts. The aerodynamic refinements would also improve fuel efficiency. In the new design, the front of the cab is rounded, and a fairing covers the space between the cab and trailer. The combination establishes an airstream that is aerodynamically attached to the exterior of the rig.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Division, P.O. Box 8757, BWI Airport, MD. 21240; (301) 621-0100 Ext. 241. Inquiries concerning rights for the commercial use of this invention should be addressed to Darrell G. Brekke, Hugh L. Dryden Flight Research Center, Mail Code: 201-11A, Moffett Field, CA 94035; (415) 965-5104. In either case refer to FRC-11058/TN.

Inflatable Rescue Capsules: Rescue spheres transfer people from a disabled vehicle to a rescue vehicle
See 1002

Interactive Graphics Analysis for Aircraft Design: Aircraft geometry is displayed on an interactive terminal
See 0011

1014 Lubricant Effects on Transmission Power Loss: Several lubricants are evaluated for mechanical efficiency
Army Materiel Development and Readiness Command,
Alexandria, VA.
Jul 84 *(D, F)*

Efficiency tests were conducted on 11 different lubricants to determine various effects physical and chemical properties of lubricating oils have on power loss in transmissions. The study was conducted by the U.S. Army Aviation Research and Development Command. The lubricants tested, which are all commercially available, included two different automatic-transmission oils, five different turbine engine oils, and four different synthetic oils. A wide range of viscosities, specific heats, specific gravities, and viscosity-pressure coefficients were represented.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A119176/NAA, price code: A02, or contact project officer John J. Coy (314) 263-1625.

Measuring Locomotive Drawbar Pull: A coupler pin becomes an accurate and rugged force sensor
See 0517

1015 Measuring Power Flow in Electric Vehicles: Instrument accommodates switching transients and common-mode voltages
National Aeronautics and Space Administration,
Washington, DC.
Aug 84 *(B, K)*

The power to and from the battery of an electric vehicle is recorded by a new instrument. The instrument accommodates the fast rise and fall times of the waveforms characteristic of modern, efficient power controllers. The new power meter multiplies analog signals proportional to voltage and current and converts the resulting signal to a frequency. Included are isolated power supplies, which are necessary for common-mode rejection.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15514/TN.

Measuring Slurry Flow: Noncontact ultrasonic instrument is accurate and versatile
See 0520

1016 Methane-Based Fuels for Automotive Fleet Vehicles: Publication shows how to exploit an alternative fuel for cars and trucks
Department of Energy, Washington, DC.
Jun 84 *(C)*

A report assesses issues related to the supply and use of methane-related fuels in automotive engines. 'Methane', in the report, includes natural gas as well as synthetic gas derived from coal, biomass, waste products, and other renewable resources, provided that methane is the predominant constituent. The results from technical, supply, and economic assessments and identifies research for the expanded use of natural gas in automotive vehicles are summarized.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-000280, price code: A04. For information not in the report, contact Ralph D. Fleming, U.S. Department of Energy, CE-131.2, Washington, DC 20585; (202) 252-8055.

More Durable Tread for Tracked Vehicles: Aramid fibers added to tread rubber seem to increase durability
See 0804

Optical Receiver for a Prototype Remote-Sensing Natural Gas Leak Detector
See 0542

1017 Performance of High-Mobility Wheeled Vehicles: They outperform conventional trucks on a wide variety of terrain

Army Materiel Development and Readiness Command, Alexandria, VA.

Aug 84 *(D)*

A report analyzes the performance of high-mobility multipurpose wheeled vehicles (HMMWV's) and compares them with conventional vehicles. The vehicles are assessed for off-road and on-road performance. The report was prepared for the U.S. Army Material Development and Readiness Command. The performance criteria were speed profiles, percentages of total terrain area in which the vehicles were immobilized, factors causing immobilization, factors limiting speed, vehicle acceleration, speed on slopes, and stability during turns on side slopes. In addition, air transportability of the vehicles was evaluated.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A129216/NAA, price code: A08, or contact project officer Wayne Ferguson (301) 278-6438.

1018 Power System for Electrical Vehicles is Being Developed

Department of the Army, Washington, DC.

Jun 84 *(C)*

A new low maintenance, lead-acid battery under test may be a major step in the development of a practical power system for electrical vehicles. This gelled electrolyte battery differs from standard wet cell batteries because its sulfuric acid electrolyte is suspended in a gel of fumed silica and phosphoric acid. This feature eliminates the need to add water and increases the life of the battery. In addition to low maintenance and longer life, the new battery requires less time to recharge. It is within the utility load leveling window, the time late in the evening when the requirement for electricity is lowest and vehicles can be recharged without overburdening the power distribution system.

FOR ADDITIONAL INFORMATION: Contact: Dr. Alayne Adams, U.S. Army Belvoir R&D Center, Fort Belvoir, VA 22060, (703) 664-5309.

Rain and Dew Detector: Moisture between fingerlike electrodes actuates a simple alarm circuit
See 0554

1019 Searching for Clear-Air Turbulence: An airborne microwave system would locate the tropopause to assist in the avoidance of clear-air turbulence

National Aeronautics and Space Administration, Washington, DC.

Jun 84 *(K)*

A system for determining the potential location and severity of clear-air turbulence is based on a passive microwave sensor. Mounted on the side of an airplane, for example, such a system could allow a pilot to evade clear-air turbulence. The sensor would permit safer, more comfortable flights for commercial airplanes and would enable safer inflight refueling for military airplanes. Flight evaluation with prototype hardware shows the concept to be workable.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15251/TN.

Test-Bench Dynamometer: It would simulate programs for electric/hybrid vehicle design
See 0571

1020 Transporter for Treated Sheet Materials: Plastic spacers keep parts separated during transport or storage

National Aeronautics and Space Administration, Washington, DC.

Oct 84 *(F)*

A cart with rods and spacers holds sheets with delicate finishes for storage or transport. The sheets can be supported vertically by the rods or horizontally. The spacers keep the sheets separated. The cart was originally designed to eliminate the time and expense of tapping, wrapping, and sometimes refinishing aluminum sheets with delicate anodized finishes. It could have similar benefits in the optical and plating industries.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB83-925610, price code E02.

1021 Tritium Radioluminescent Lighting Developed for Remote Sites

Department of the Air Force, Washington, DC.

Apr 84 *(C, D)*

A method has been developed to use radiation from radioisotopes in combination with phosphors to develop an energy-efficient method of lighting small isolated airfields, especially in cold areas. Radioluminescent lighting has been used in industry for clock dials, exit signs, and light standards in the photographic industry. The military has used light-emitting paints for aircraft dial illumination, wire field markers, and gunsight illumination. The Air Force is now investigating alternative airfield lighting systems. In addition to high electric power costs, current airfield lights use incandescent bulbs which require frequent maintenance and replacement. The use of tritium RL lighting eliminates line losses and should greatly reduce maintenance. Tritium RL lighting provides a self-contained, lightweight lighting system for tactical bare base employment which can be readily adapted to permanent airfields during periods of contingency. The research conducted under this effort addressed the dependability and durability of the tritium lights in extremely cold temperatures. The results of this research can be applied equally to nonmilitary airports in rural areas or where extreme environmental conditions prevail. These lights are less expensive and easier to install than current incandescent systems and require little or no maintenance. In addition, they eliminate optical illusions caused by the halo effects from filaments in incandescent lighting.

FOR ADDITIONAL INFORMATION: Contact: Thomas C. Hardy, Hq Air Force Engineering and Services Center Airbase Survivability, Tyndall AFB, FL 32403; (904) 283-6493.

Vehicle Ride Quality Meter
See 0583

SUBJECT INDEX

Index entries are selected to indicate important ideas and concepts presented in a technology summary. When using the subject index, be sure to look under terms that are narrow, broad, or related to a particular topic. The entries are arranged alphabetically by subject term. Individual items listed under subject terms are arranged alphabetically by title.

SUBJECT INDEX SAMPLE ENTRY

Subject index term

GRANULATION
Waste Granulation Process for Production or Waste Storage
See 0560

Title

Catalog reference number

SUBJECT INDEX

ABANDONED WELLS
Methods for Determining the Location of Abandoned Wells
See 0920

ABSORBERS(MATERIALS)
Intermetallic Absorber for Hydrogen: A new compound offers a medium for separating hydrogen from other gases
See 0106

ABSORPTION
Cracks in Glass Polymers Induced by Solvent Absorption: The combination of soluble particles and absorbed solvents cause polymer cracking
See 0763

ACCELERATORS
Improved Heavy-Ion Linac: Radio-frequency quadrupole linac biomedical and nuclear research potentials
See 0973

ACOUSTIC DETECTION
Acoustic Design Improves Composite Impact Resistance: Composite acoustic response to impact should be included in design criteria
See 0743

ACOUSTIC EMISSION TESTING
Monitoring Welding With Acoustic Emissions: Technique is useful for in-process evaluation
See 0677

ACOUSTIC EMISSIONS
Acoustic Emissions Reveal Combustion Conditions: Turbulent-flame acoustic emissions change with air/fuel ratio variations
See 0159

ACOUSTIC EQUIPMENT
Acoustic Tooth Cleaner: An acoustically-energized water jet aids in plaque breakdown
See 0038

ACOUSTIC LEVITATION
Acoustic Levitation With Less Equipment: Certain chamber shapes require fewer than three acoustic drivers
See 0447
Acoustical-Levitation Chamber for Metallurgy: The sample can be moved to different positions for heating and quenching
See 0744
Classifying Particles by Acoustic Levitation: Separation technique is well suited to material processing
See 0603

ACOUSTIC MEASUREMENT
Measuring Ultrasonic Shear-Wave Velocity: A technique using a reference sphere increases accuracy
See 0526

ACOUSTOOPTICS
Obtaining Pulses From a CW Laser: Two acousto-optic modulators operate in tandem
See 0979

ACQUIRED IMMUNE DEFICIENCY SYNDROME
Method of Continuous Production of Retroviruses (HTL V-III) from Patients with AIDS and pre-AIDS
See 0868
Serological Detection of Antibodies to HTLV-III in Sera of Patients with AIDS and pre-AIDS Conditions
See 0885

ACTINIDE SERIES
Resonance Ionization Mass Spectrometry
See 0131

ACTIVATED CARBON TREATMENT
Activated Carbon Process for the Treatment of Cadmium(II)-Containing Wastewaters
See 0378
Dewatering Peat With Activated Carbon: A proposed process should produce enough gas and carbon to sustain itself
See 0319

ADAPTERS
Bidirectional Fiber-Optic Cable Adapter: Two different wavelengths of light are transmitted in opposite directions on a single optical fiber
See 0956

ADDITIVES
Gelled Anti-icing Agents: A gelling agent such as pectin is added to an antifreeze/water mixture
See 0099
Measuring Additive Concentrations in Lubricating Oils: Nuclear magnetic resonance provides qualitative and quantitative information on key additives
See 0799
Modified Antifreeze Liquids for Use on Surfaces: Viscosity agents and antifreeze liquids are evaluated
See 0803
New Way to Preserve Antifreeze Has Been Developed
See 0923

ADHESIVE BONDING
Hot-Melt Adhesive Attachment System: An adhesive system is effective on Earth and in space
See 0652

ADHESIVES
Adhesive Removal From Protective Clothing: An electric eraser removes butyl cement from protective coveralls
See 0745
Liquid-Oxygen-Compatible Cement for Gaskets: Fluoroelastomer and metal are bonded reliably by a new procedure
See 0793
Radiation Improves Materials Bonding: Bonds with fluorocarbons are made without surface preparation
See 0818
Reducing the Resistance of Conductive-Adhesive Bonds: Current pulses lower the resistance of silver-filled epoxies
See 0286
Sample Holder for Cryogenic Adhesive Shear Test: Five samples would be tested in one cooldown
See 0558
Standards for Epoxies Used in Microelectronics: Report has significant commercial applications
See 0832

AEROBIC PROCESSES
Descriptions For Reservoir Chemical Processes Are Developed
See 0144

AERODYNAMIC CHARACTERISTICS
Compressible Stability Analysis Code for Transition Prediction in Three-Dimensional Boundary Layers: Black box code for swept and tapered wings
See 0005
Extended Vortex Lattice Method: Aerodynamic characteristics are determined for up to four complex planforms
See 0009
Fast Generation of Boundary-Conforming O-Type Grids: Algorithm generates grids for arbitrary wing-body and axial turbomachinery geometries
See 0010
Lift Effect of Cambered Calculating the Vortex-Wings: Program computes the vortex-lift effect by using an improved supersonic suction analogy
See 0012

AERODYNAMIC DAMPING
Two-Degree-of-Freedom Mount System for Flutter Models: Flexible rods replace conventional bearing supports to minimize structural damping
See 0577

AERODYNAMIC DRAG
Minimum Induced Drag of Nonplanar Wings: Numerical optimization techniques calculate the required bound-circulation distribution
See 0013

AERODYNAMICS
PANEL Code for Planar Cascades: Plane cascade flow is solved using improved surface-singularity methods
See 0169
Subcritical Wing Design Code: program uses higher-order far-field drag minimization
See 0018

AGING TESTS(MATERIALS)
Lithium/ulfuryl Chloride Battery: Safety and long shelf life are sought
See 0349
New Way to Preserve Antifreeze Has Been Developed
See 0923

AGRICULTURAL ECONOMICS
Impact of Land-Based Biomass Production: Several models are evaluated
See 0914

AGRICULTURE
Frost Forecasting for Fruitgrowers: Progress in forecasting from satellite data is reviewed
See 0035

AIR FILTERS
Evaluation of High-Efficiency Particulate Air Filters: Structural test results characterize ventilation filters for nuclear facilities
See 0632

AIR FLOW
Dissociated Airflow Effects During Plasma-Arc Testing: Program computes heating rates and surface-friction effects
See 0008
Guidelines For Accurate Mine Airflow Measurements
See 0911

AIR POLLUTION
Air Land Water Analysis System (ALWAS): A Multi-Media Model for Toxic Substances
See 0379
Energy and Air Quality: Handbook aids in planning the growth of energy facilities
See 0394
How Synfuels Behave in Gas Turbines: Combustion products can be different from those of petroleum-based fuels
See 0338
Sulfur Dioxide Concentration Analysis From Multiple, Randomly Varying Sources
See 0434
Surrogate Hazardous Wastes May Simplify Incinerator Monitoring
See 0435

AIR POLLUTION ABATEMENT
Desulfurizing Coal by Chlorinolysis and Hydrogenation: A two-process combination removes more sulfur than either process alone
See 0391
Dynamic Simulation of Chemical Processes: A variety of software packages are evaluated
See 0393
New Insights Into Recirculating Bed Reactors: Coal mixer modeling and coal hydrodesulfurization are examined
See 0417
Oil Burner With Nearly Stoichiometric Combustion: A method of vaporizing and mixing the fuel increases the thermal efficiency to 84 percent
See 0167
Simulating Transportation and Storage in Coal Refining: Computer model analyzes hypothetical situations and highlights problems
See 0431
Stirred Reactor Dynamics: Effects of the vortex induced by a stirrer are examined
See 0135

AIR POLLUTION CONTROL
Asbestos Removal And Disposal Information System
See 0385

SUBJECT INDEX

AIR POLLUTION CONTROL EQUIPMENT

Diesel Particulate Destruction: A pulsed electrical discharge eliminates particulates in diesel exhaust
See 0392

How to Reduce Shearer Operators' Dust Exposure By Using Remote Control
See 0913

A Multifuel, Low-Emission Gas Turbine: Variable-area air injector improves efficiency at all power levels
See 0416

Reducing Longwall Face Workers' Respirable Dust Exposure From Roof Support Movement
See 0928

Reducing Soot in Diesel Exhaust: Electrically charged fuel improves oxidation
See 0426

Three-Zone Catalyst Resists Sulfur Poisoning: Zone configuration and composition increase efficiency
See 0437

AIR POLLUTION CONTROL EQUIPMENT

Computer Model Developed to Help Predict Solutions to Electrostatic Precipitators Problems
See 0390

Mathematical Model of Electrostatic Precipitation for the Texas Instruments Programmable 59 Calculator
See 0410

Scrubber in Blowing Section Offers Good Ventilation Taking 50 Foot Cuts
See 0930

AIR POLLUTION DETECTION

Analysis of Polynuclear Aromatic Hydrocarbons in Particulate Matter by Luminescence Techniques
See 0381

Development of a Continuous Monitor for Detection of Toxic Organic Compounds
See 0469

Development, Design, and Operation of a Cascade Impactor
See 0470

Submarine Air Monitoring System Improved
See 0564

Totally Optical Technique for Monitoring Ambient Non-Methane Hydrocarbons
See 0576

AIR QUALITY

Energy and Air Quality: Handbook aids in planning the growth of energy facilities
See 0394

Guidelines for Monitoring Indoor Air Quality
See 0403

Sulfur Dioxide Concentration Analysis From Multiple, Randomly Varying Sources
See 0434

AIRCRAFT

Circulation Control Upper Surface Blowing High-Lift Wing Developed
See 0003

Crash Simulation and Nonlinear Structural Analysis: Behavior of structures composed of trusses, frames, and membranes is modeled
See 0006

Design and Fabrication of Composite Tail Rotor Components: Composites provide higher strength and lower weight
See 0616

Interactive Graphics Analysis for Aircraft Design: Aircraft geometry is displayed on an interactive terminal
See 0011

Reducing Aircraft-Engine Noise: Shock structure is modified to eliminate the associated noise
See 0172

Simulating Atmospheric Turbulence: Dimensionless time series for gusts and gradients have been calculated with a model
See 0037

AIRCRAFT CARRIERS

Coating for Carrier Decks Improved
See 0004

AIRCRAFT EQUIPMENT

Determining Aircraft Altitude: Image motion and aircraft speed determine altitude
See 0007

AIRCRAFT LANDING AREAS

Tritium Radioluminescent Lighting Developed for Remote Sites
See 1021

AIRCRAFT NOISE

Noise Control in Propeller-Driven Aircraft: Double-wall sidewalls minimize interior noise and weight
See 0015

Predicting Aircraft Noise Levels: Program predicts noise levels from data on fan, combustor, turbine, and airframe sources
See 0017

AIRFOILS

Shock-Free Airfoil Cascades: Fast design and analysis uses fictitious gas concept
See 0988

AIRSHIPS

Airship Tested
See 0001

ALCOHOLS

High-Yield Alcohol Fermentation Process: Vacuum fermentation combined with vacuum distillation reduces energy needs
See 0102

Low-Pressure Alcohol Distillation: Heat requirements are lowered for the process
See 0107

Retrofitting Diesels to Burn Alcohol: The problems and future potential of using ethanol as a fuel in diesel engines are discussed
See 0173

ALIGNMENT

Conical Electrical Connectors Aline Easily: Rotational alinement is not critical in a design useful for remote manipulators
See 0231

Determining Crystal Orientation by Laser Diffraction: Rapid, accurate method employs inexpensive equipment and requires minimal sample preparation
See 0962

ALTITUDE

Determining Aircraft Altitude: Image motion and aircraft speed determine altitude
See 0007

ALUMINUM AND ALUMINUM ALLOYS

Crack Initiation and Propagation in Alloys: Study characterizes mercury-embrittled aluminum, steel alloys, and brass
See 0762

Creep Tests of Hot Aluminum Alloy: Results of 48-hour tests are presented
See 0764

Fabricating Slotted-Waveguide Arrays From Sheet Metal: Low-cost lightweight waveguides are formed from rolls of aluminum
See 0246

Reducing the Resistance of Conductive-Adhesive Bonds: Current pulses lower the resistance of silver-filled epoxies
See 0286

Reinforcement for Stretch Formed Sheet Metal: Metal reinforcement is flame-sprayed on the edges gripped in the stretch-forming setup
See 0695

Stress-Corrosion Cracking of Certain Aluminum Alloys: The SC resistance of new high-strength alloys is tested
See 0834

Walnut Hulls Clean Aluminum: Hulls inflict minimal substrate damage
See 0840

ALUMINUM GALLIUM ARSENIDES

Characterizing Aluminum/Gallium Arsenide Semiconductors: Mechanisms of operation are elucidated
See 0959

ALUMINUM MATRIX COMPOSITES

Interface Reactions in Metal-Matrix Composites: An intermediate layer between fiber and matrix determines the mechanical properties of the composite
See 0792

Tensile Strengths of Alumina Fiber Composites: High correlation between experimental and theoretical results is obtained
See 0837

ALUMINUM NITRIDES

SiC-AlN Ceramics: New ceramic material for diesel engine application is characterized
See 0827

ALUMINUM OXIDE

Tensile Strengths of Alumina Fiber Composites: High correlation between experimental and theoretical results is obtained
See 0837

AMMONIA

New Catalytic Reactions Cut Energy Requirements: Reactions that ordinarily consume a large amount of energy proceed at much lower temperatures
See 0117

AMMONIUM FLUORIDES

Control of Decay in Above-Water Marine Pilings
See 0940

AMMUNITION

Fire Retardants in Packaging: Wooden boxes and fiber containers for ammunition storage are treated with fire retardant to eliminate spread of fire
See 0779

AMORPHOUS MATERIALS

Cracks in Glass Polymers Induced by Solvent Absorption: The combination of soluble particles and absorbed solvents cause polymer cracking
See 0763

Preparing Pure Silicon Monohydride: RF-sputtering process produces substantially pure amorphous silicon monohydride
See 0127

Producing Metallic Glasses With Acoustic Levitation: Acoustic fields support and cool liquid particles
See 0814

ANAEROBIC PROCESSES

Descriptions For Reservoir Chemical Processes Are Developed
See 0144

Formation of Nitrosamines Under Denitrification Conditions: Microbial denitrification systems may produce toxic, carcinogenic nitrosamines
See 0402

ANCHORING

Engineering Data Base Aids in Selection and Sizing of Anchors
See 0941

ANGLES(GEOMETRY)

Circuitry for Angle Measurements: An angle resolver is pulsed and read under microprocessor control
See 0457

ANILINES

Analytical Procedures for Aniline and Selected Derivatives in Wastewater and Sludge
See 0382

ANNEALING

Annealing Solar Cells With Lasers: Large-area process removes ion damage
See 0301

Formation of Supersaturated Alloys for Semiconductor Device Applications
See 0249

ANTENNA ARRAYS

Radio-Frequency and Wideband Modulation Arraying: The summing network receives coherent signals from all the receivers in an array
See 0187

SUBJECT INDEX

ANTENNA FEEDS

Estimating Waveguide-Feed Directivity and Spacing: Approximate curves simplify initial steps of antenna design
See 0244

ANTENNAS

Broadbeam Antenna-System Measurements Have Been Made Easier
See 0227

Decoupling a Reflecting Layer From Its Support Structure: Proposed mounting isolates the main support through intermediate flexural supports
See 0232

Low Loss Two-Signal Microwave Antenna Coupler
See 0265

Minimizing Vibrations While Orienting Large Structures: Control algorithm times thrustor pulses to minimize vibrations
See 0271

Near-Field Antenna Measurements Approximated
See 0273

Printed Circuit Converts RF Energy to dc Power: An ultra-light-weight, large-area, antenna/rectifier has 85 percent conversion efficiency
See 0281

ANTIBODIES

New Standard Antibody Sera Are Now Available From CDC
See 0873

Serological Detection of Antibodies to HTLV-III in Sera of Patients with AIDS and pre-AIDS Conditions
See 0885

ANTIFREEZES

Gelled Anti-icing Agents: A gelling agent such as pectin is added to an antifreeze/water mixture
See 0099

Modified Antifreeze Liquids for Use on Surfaces: Viscosity agents and antifreeze liquids are evaluated
See 0803

New Way to Preserve Antifreeze Has Been Developed
See 0923

ANTINEOPLASTIC AGENTS

Prodrugs Based on Phospholipid-Nucleoside Conjugates: New substances last longer in the body and are more effective
See 0882

AQUACULTURE

Aquaculture Methodology for Rearing Moluscs
See 0021

Cage Culture of Yearling Surf Clams
See 0022

AQUATIC PLANTS

Feasibility of Applying Genetic Engineering Technology to Aquatic Plant Control is Studied
See 0856

Simulating Mechanical Control Operations: A computer model can simulate mechanical harvesting operations using any specific mechanical system operated in any realistic environment
See 0887

AQUIFERS

Aquifer Thermal-Energy Storage: A guide tells how to design and evaluate aquifer thermal-energy storage systems
See 0893

Sampling Aquifer Thermal-Energy Storage Systems: Guidelines are offered for gathering, storing, and analyzing water specimens
See 0366

ARABIDOPSIS

Detection of Carcinogenicity Based on Mutagenicity in Arabidopsis
See 0854

ARMOR

Intercritically Rolled Steels: Dynamic characteristics of these hard, fracture-resistant materials are presented
See 0791

AROMATIC POLYCYCLIC HYDROCARBONS

Analysis of Polynuclear Aromatic Hydrocarbons in Particulate Matter by Luminescence Techniques
See 0381

Negative Ion Chemical Ionization Mass Spectroscopy (NICIMS) Successfully Detects Trace Compounds
See 0115

ARTHRITIS

Drug for Skin Diseases is Successful for Treating Arthritis
See 0855

New Chemical Markers of Septic Arthritis Have Been Identified in Bone-Joint Fluids
See 0871

ASBESTOS

Asbestos Fiber Determination in Water Samples: Preparation techniques, improved analytical method, and rapid screening
See 0384

Asbestos Removal And Disposal Information System
See 0385

Calcium-Free Asbestos for Fuel Cells: An organic-acid salt removes unwanted calcium without weakening the asbestos
See 0306

ATMOSPHERIC TURBULENCE

Simulating Atmospheric Turbulence: Dimensionless time series for gusts and gradients have been calculated with a model
See 0037

ATOMIZERS

Rapid Solidification Processing Research Atomizer Constructed
See 0555

ATTENUATION

Report Reviews Prediction Of Microwave Attenuation By Rainfall
See 0189

ATTITUDE CONTROL

Attitude Control by Localized Outgassing: Reaction forces and torques would be generated by vaporizing material with a laser
See 0452

ATTRACTANTS

Jamming Courtship Signals with Scent Molecules May Curb Insect Pest
See 0026

AUDIO CONVERTERS

Two-Wire to Four-Wire Audio Converter: A simple circuit provides an interface between normally incompatible voice-communication lines
See 0191

AUDIOVISUAL EFFECTS

Automatic Control of Multimedia Shows: An audiovisual program is synchronized digitally
See 0948

AUDITORY PERCEPTION

Portable Communicator Has Been Developed for Non Vocal People
See 0062

AUGERS

Tool for Guiding an Auger: A threaded ram with the same pitch as the auger reduces potential damage to fragile workpieces
See 0729

AUTOMATIC CONTROL

Automatic Control of Multimedia Shows: An audiovisual program is synchronized digitally
See 0948

Lighting-Control Strategies That Save Energy: Two automatic-control schemes offer substantial energy savings for commercial buildings
See 0348

AUTOMATIC TEST EQUIPMENT

Economic Model Assesses Benefits of Improved Test Accuracy
See 0623

Fast Electronic Solar-Cell Tester: Microcomputer-controlled system gathers current and voltage data
See 0483

AUTOMATION

Automated Coal-Mine Shuttle Car: A cable-guided car would increase efficiency in underground coal mines
See 0894

Buyer's and User's Guide to Flexible Manufacturing Systems: Detailed advice is offered on acquiring a system, installing it, and operating it
See 0597

Computer-Controlled Laser Welding: Limited access joints in a gas-turbine recuperator are welded using a moving-mirror, computer-controlled CO2 laser
See 0609

Flexible Manufacturing Systems: Strategies for improving productivity with computers are presented
See 0639

Hollow-Sphere Production Line: After initial formation, spheroids are processed without the contaminating touch of solid objects
See 0651

Materials Laboratory Demonstrates Automated Sheet Metal Blanking Cell
See 0674

Requesting and Preparing Proposals: Samples provide guidance on form and content
See 0700

Robotic Control System for Excavation Equipment: Full automation offers great flexibility
See 0154

Robotic Off-Line Programming Applications Is Demonstrated
See 0706

Robotic Water-Blast Cleaner: Automated system will be fast, safe, and efficient
See 0707

Technology for Flexible Manufacturing: Key subsystems are described
See 0724

AUTOMOBILE ENGINES

Methane-Based Fuels for Automotive Fleet Vehicles: Publication shows how to exploit an alternative fuel for cars and trucks
See 1016

AUTOMOBILES

Containment for Flywheels: R&D is proceeding on low-cost, reliable means for containing the fragments of disintegrating automotive flywheels
See 1008

Dispensing Small Measured Volumes of Liquid: Unit measures, filters, and unloads oil into a container
See 1009

Equations for Automotive-Transmission Performance: A curve-fitting procedure ensures high confidence levels
See 1010

Test-Bench Dynamometer: It would simulate programs for electric/hybrid vehicle design
See 0571

Vehicle Ride Quality Meter
See 0583

AUTOMOTIVE TRANSMISSIONS

Lubricant Effects on Transmission Power Loss: Several lubricants are evaluated for mechanical efficiency
See 1014

AVIATION ACCIDENTS

Crash Simulation and Nonlinear Structural Analysis: Behavior of structures composed of trusses, frames, and membranes is modeled
See 0006

SUBJECT INDEX

AVIATION SAFETY
Searching for Clear-Air Turbulence: An airborne microwave system would locate the tropopause to assist in the avoidance of clear-air turbulence
See 1019

AXIAL FLOW COMPRESSORS
Design of Multistage Axial-Flow Compressors: Computer program develops blading geometry and performance parameters
See 0617

AXIAL FLOW TURBINES
Off-Design Turbine Modeling: Off-design efficiency and flow function are obtained from design-point input data
See 0166

BACTERIA
Bacteria Count Photometer is Developed
See 0999
Detection of Carcinogenicity Based on Mutagenicity in Arabidopsis
See 0854
Flowthrough Bacteria-Detection System: An online system allows repetitive cycling of sample intake, bacteria counting, and sterilization
See 0484
Formation of Nitrosamines Under Denitrification Conditions: Microbial denitrification systems may produce toxic, carcinogenic nitrosamines
See 0402
Making Food From Sawdust
See 0027
Microbial Enhancement of Oil Recovery: Bacteria aid in oil production and utilization
See 0921

BALL BEARINGS
Ball Bearing Assembly Device Developed
See 0595

BALLASTS(ELECTRIC)
Solid-State Ballasts for Fluorescent Lamps: Major savings in lighting energy can be realized
See 0289

BANDPASS AMPLIFIERS
Band-Pass Amplifier Without Discrete Reactance Elements: Inherent or 'natural' device capacitance is exploited
See 0225

BARRIER MATERIALS
Evaluation of a Containment Barrier for Hazardous Material Spills in Watercourses
See 0400

BEAM SPLITTERS
Beam Splitter Introduces Little Aberration: Placing a beam splitter inside an existing lens minimizes aberrations
See 0955
Instrument Measures Airflow Friction Without Contact: A laser interferometer monitors the thickness of a shearing oil film
See 0501

BEARINGS
Ball Bearing Assembly Device Developed
See 0595
Bearing Measuring Fixture: Tool increases accuracy and reduces labor
See 0453
Chromium Ion Implantation Can Prevent Corrosion in Steel Bearings Used in Navy Aircraft
See 0002
Economic Analysis of Bearing Refurbishment: Restoring used bearings can provide substantial savings
See 0622
Passive Magnetic Bearing: A torsion wire assists permanent-magnet elements in maintaining shaft centering
See 0678
Portable Roller Staking Tool: Staking tool is compact and portable
See 0686
Staked-Bearing Removal Tool: A portable air-powered tool enables rapid bearing replacement with minimum effort
See 0720
Testing Bearings in Tight Spaces: Tool turns a force around 90 deg to test bearings in cramped places
See 0725
Tooling Converts Stock Bearings to Custom Bearings: Grinding process uses a special bearing holder
See 0733

BEHAVIOR
Biofeedback-Mediated Behavioral Treatment of Airsickness
See 0846

BELT CONVEYORS
Conveyor Belt Service Machine
See 0898

BENDING
Bender/Coiler for Tubing: An easy-to-use tool makes coils of tubing
See 0596

BENTHOS
Procedure For Benthic Resources Assessment (BRAT) Has Been Developed
See 0945

BENZENES
Development of a Continuous Monitor for Detection of Toxic Organic Compounds
See 0469

BINDERS(MATERIALS)
Preventing Moisture Damage to Bituminous Materials: Damage inhibitor is abundant in shale oil
See 0152
Quick-Setting Polymer Concrete: High strengths are obtained using a water-soluble binder
See 0153

BIOASSAY
Flowthrough Bacteria-Detection System: An online system allows repetitive cycling of sample intake, bacteria counting, and sterilization
See 0484
Instrument is Developed to Measure Lead in Human Tibia
See 0500
A New Class of Chemical Labels Has Been Developed
See 0118

BIOCHEMICAL MARKERS
Biochemical Markers Useful in Preventing Cancer and Cardiovascular Disease Developed
See 0845
New Chemical Markers of Septic Arthritis Have Been Identified in Bone-Joint Fluids
See 0871

BIOCHEMISTRY
Linear Position-Sensitive X-Ray System
See 0508

BIOFEEDBACK
Biofeedback-Mediated Behavioral Treatment of Airsickness
See 0846

BIOMASS
Analysis of Short-Rotation Forests: Economic strategies are evaluated
See 0892
Impact of Land-Based Biomass Production: Several models are evaluated
See 0914
Removing Biostatic Agents From Fermentation Solutions: Liquid carbon dioxide is an inexpensive solvent
See 0883
Renewable Energy for Industry: Guidance is given for evaluating and financing biomass, waste, solar, and wind sources
See 0365

BIOMEDICAL RESEARCH
Improved Heavy-Ion Linac: Radio-frequency quadrupole linac biomedical and nuclear research potentials
See 0973
Non-linear Regression Program Developed
See 0211
Non-Linear Regression Program Fits Data to Non-Linear Models: Personal Microcomputers Used
See 0212

BIOTECHNOLOGY
Biotechnology Resources Directory Revised
See 0847
New Liquid Compound Separation Technique Developed
See 0119

BIRDS
Flexible Method for Analyzing Bird Band Recovery Data
See 0858

BISMUTH
Solidifying Bi/MnBi at Low Gravity: The intrinsic coercivity of the manganese/bismuth system comes close to the theoretical maximum
See 0830

BISMUTH MANGANESE
Solidifying Bi/MnBi at Low Gravity: The intrinsic coercivity of the manganese/bismuth system comes close to the theoretical maximum
See 0830

BISPHENOL A
Fire-Resistant Composites: A resin blend produces high-char-yield, low-smoke composites
See 0780

BITUMENS
Bituminous Equipment for Road Paving: Present and future areas of development are presented
See 0142

BITUMINOUS SANDS
Extracting Oil From Tar Sands: Oil can be extracted using solar energy
See 0328

BLACKOUT(PROPAGATION)
Shuttle Communications Blackout Study: The RF power loss through a three-dimensional plasma sheath is computed
See 0190

BLAST EFFECTS
Predicting Rubble Motion in Blasts: Computer model makes it possible not only to blast rock but also to move the broken rubble in a predictable manner
See 0925

BLINDNESS
Laser Treatment May Prevent Blindness for Some Victims of Histoplasmosis
See 0053

BLOOD DISEASES
Sickle Cell Anemia: New Approaches To Therapy
See 0886

BLOOD FLOW
Instrument is Developed for Ramp Injection of Radiotracers for Blood Flow Measurement by Emission Tomography
See 0052

BLOOD PLASMA
Serum or Plasma Specimens from Transfusion-Transmitted Viruses Study are Available
See 0064

BLOOD SERUM
Serum or Plasma Specimens from Transfusion-Transmitted Viruses Study are Available
See 0064

BLOOD VESSELS
Computer Analysis of Eye Blood-Vessel Images: Technique rapidly diagnoses diabetes mellitus
See 0043

BODY TEMPERATURE
Effectiveness of Cooling Garments: Water-cooled vests with portable heat exchangers are evaluated
See 0046
Heat Absorbing Gel Developed
See 0050

BOILERS
Evaluation of Steam Generators for Oil Wells: Downhole steam generation appears to be effective, but corrosion is a problem
See 0908
Waste Oils Fuel Navy Boilers
See 0443
Wood-Fueled Boiler Unit: Study evaluates the efficiency and emissions of a prototype central-heating unit
See 0377

BOLTS
Locking Bolt: A locking ball in the bolt head holds the wrench in place
See 0667
Tool for Tightening Bolts With Knurled Heads: A modified clamp transfers a torque to the bolthead
See 0732

BONDED JOINTS
Detecting Defective Solder Bonds: The method is noncontact and nondestructive
See 0618
Reducing the Resistance of Conductive-Adhesive Bonds: Current pulses lower the resistance of silver-filled epoxies
See 0286

BONDING
Hot-Melt Adhesive Attachment System: An adhesive system is effective on Earth and in space
See 0652
Polymer Bonding of Optical Fibers: Optical waveguides are coupled through their sides
See 0982

BONES
Bone Damage Linked To Long-Term Steroid Therapy
See 0848

BOREHOLES
Borehole Seismic Unit: Fracture orientation can be measured by using a triaxial geophone package located within the wellhole
See 0897

BRACES
Lightweight, Economical Device Alleviates Drop Foot: Corrective apparatus alleviates difficulties in walking for victims of drop foot
See 0054

BRAIN
Studies Show Zinc Deficiency Retards Brain Development In Rats
See 0890

BRAKE FLUIDS
Corrosion Effects of Mixed Brake Fluids: Addition of new silicone brake fluid to conventional ones does not significantly increase corrosion
See 0757

BREAKWATERS
Floating Breakwater Research Is Developed
See 0942

BRIDGES
Low Cost Bridge Deck Surface Treatment
See 0149

BRIDGMAN METHOD
Thermal Modeling of Bridgman Crystal Growth: Heat flow is modeled for a moving or stationary rod-shaped sample inside a directional-solidification furnace
See 0994

BROMINATION
Bromination Process for Disposal of Spilled Hazardous Materials
See 0387

BUILDINGS
Algorithm Developed For Best HVAC Start/top Times
See 0069
Computer Program Simulates Room Fires and Estimates Safet Egress Time
See 0071
Criteria Has Been Established For Solar Heating And Cooling
See 0072
Daylighting Can Cut Energy Use
See 0073
Designing Glass Panels for Economy and Reliability: Method considers such factors as glass temper and load duration
See 0767
Figuring Residential Energy With Pocket Calculator: Consumption for heating and cooling can be calculated quickly and easily
See 0329
Guide to Calibrating Temperature Devices is Available
See 0490
Guidelines for Monitoring Indoor Air Quality
See 0403
Reducing Housing Moisture Damage in Humid Climates
See 0079
Solar Energy Studies Computer Program Developed
See 0081

BURN UP
Resonance Ionization Mass Spectrometry
See 0131

BURNERS
Oil Burner With Nearly Stoichiometric Combustion: A method of vaporizing and mixing the fuel increases the thermal efficiency to 84 percent
See 0167

BURNS(INJURIES)
Investigators Work to Reduce Effects of Traumatic Eye Injuries
See 0864

BUS CONDUCTORS
Connecting Separate Computers to a Common Bus: A network bus adapter handles protocols for computer-to-computer communications
See 0197
Hiding Solar-Array Bus Bars: End terminals are mounted under the cells, maximizing the usable illuminated area
See 0337

BUSHINGS
Tool for Replacing Bushings: The centerlines of the original bushings are maintained
See 0730

BUTYL CEMENTS
Adhesive Removal From Protective Clothing: An electric eraser removes butyl cement from protective coveralls
See 0745

CABLE ASSEMBLIES
Cable Assembly and Harness Designs: Specifications for wiring harnesses used in severe environmental conditions of combat vehicles met by commercially available materials
See 0228

CABLES(ELECTRIC)
Cable Fires Studied
See 0229
Improving Flat-Cable Manufacturing: Cable rejection rate is reduced by almost half
See 0260
Repairing Damaged Power-Cable Insulation: Simple method saves time, money, and material
See 0287
Stripper for Cables of Any Cross Section: Shoulders prevent penetration any deeper than intended
See 0294

CADMIUM
Activated Carbon Process for the Treatment of Cadmium(II)-Containing Wastewaters
See 0378

CADMIUM MERCURY TELLURIDES
Growing Crystals for Infrared Detectors: Unidirectional solidification yields bulk crystals with compositional homogeneity
See 0489

CALCIUM
Calcium-Free Asbestos for Fuel Cells: An organic-acid salt removes unwanted calcium without weakening the asbestos
See 0306

CALCIUM FLUORIDES
Secondary-Spectrum-Free Lens System: Inclusion of a calcium fluoride element allows all aberrations to be reduced to insignificant levels
See 0987

CALIBRATING
Broadbeam Antenna-System Measurements Have Been Made Easier
See 0227
Calibration Markers Produced for Video Camera
See 0230
Electricity Calibration Service For Wattmeters and Watthour Meters
See 0477
Method Has Been Developed to Remove Effects of Time Jitter
See 0528

CALORIMETERS
Gas-Temperature Measurement With Minimal Perturbation: Heat-flux transducers determine the temperature of hot, high-velocity, turbulent gases
See 0488

CANCER
Animal Tissue Specimens Available
See 0843
Biochemical Markers Useful in Preventing Cancer and Cardiovascular Disease Developed
See 0845
Device Developed to Treat Head and Neck Tumors
See 0044
Spontaneous Changes in Chromosomes May Be First Detectable Event in The Onset of Tumorigenesis
See 0889

CAPACITORS
High-Voltage Monolithic Ceramic Capacitors: Twenty-fold reductions in size are achieved
See 0255
Liquid-Impregnated Plastic-Film Capacitor: Long life, high reliability, and high energy density capacitors are obtained
See 0264

CARBAMIC ACID/AMINO
Three New Techniques for Floating Pollutant Spill Control and Recovery
See 0436

CARBON DIOXIDE
Removing Biostatic Agents From Fermentation Solutions: Liquid carbon dioxide is an inexpensive solvent
See 0883

CARBON DIOXIDE LASERS
Tuning System for High-Power CO2 Lasers: Problems associated with unstable resonators are minimized
See 0997

CARBON FIBER REINFORCED PLASTICS
Graphite/Epoxy Tow Bar: Composite bar is as strong as a conventional steel automotive tow bar
See 1012

Stronger Carbon Fibers for Reinforced Plastics: New process makes fibers 70 percent stronger at lower carbonization temperatures
See 0835

CARBON MONOXIDE
New Portable Instrument Measures CO in Blood
See 0060

CARBON REINFORCED COMPOSITES
Eddy-Current Damage Test for Carbon Composites: A nondestructive test method detects cracks in materials of low conductivity
See 0475
Forming Mirrors on Composite Materials: Smooth coatings are deposited on hard-to-polish substrates
See 0969

CARBOXYHEMOGLOBIN
New Portable Instrument Measures CO in Blood
See 0060

CARCINOGENESIS
Detection of Carcinogenicity Based on Mutagenicity in Arabidopsis
See 0854

CARDIOVASCULAR DISEASES
Biochemical Markers Useful in Preventing Cancer and Cardiovascular Disease Developed
See 0845
Researchers Test Device to Aid Cardiac Patients
See 0063

CASCADE FLOW
Shock-Free Airfoil Cascades: Fast design and analysis uses fictitious gas concept
See 0988

CASCADE IMPACTORS
Development, Design, and Operation of a Cascade Impactor
See 0470

CASKS
Survivability of Nuclear-Waste Casks: Test program simulated railroad accidents to evaluate the safety of these casks
See 0568

CASTING
CAD/CAM for Foundry Castings: High-quality steel-sand castings can be made quickly, inexpensively, and accurately
See 0598
Integrally Cast Rotors for Turbines: The cost of machining separate rotor blades can be avoided
See 0659

CATALOGS(PUBLICATIONS)
Catalog of Laminate Layers for Fluidic Devices: Basic functions are classified and discussed
See 0600
Catalog of Standard Reference Materials
See 0454

CATALYSIS
New Catalytic Reactions Cut Energy Requirements: Reactions that ordinarily consume a large amount of energy proceed at much lower temperatures
See 0117
Nitrogen Supply Uses Hydrazine: Liquid hydrazine is dissociated and residual gas removed to produce almost pure nitrogen
See 0120

CATALYSTS
Catalyst for Hydrogenation of CO: An improved catalyst reduces the costs of separating olefins from paraffins
See 0089
Catalysts for Lithium/Thionyl Chloride Cells: Organic compounds of iron or cobalt improve voltage and capacity of electrochemical cells
See 0090
Cooling by Para-to-Ortho-Hydrogen Conversion: A catalyst speeds the conversion, increasing the capacity of a solid-hydrogen cooling system
See 0095
Fuel-Cell Reactant-Gas Purifier: A catalytic purifier removes oxygen from hydrogen feedlines just upstream of a fuel-cell stack
See 0332
Three-Zone Catalyst Resists Sulfur Poisoning: Zone configuration and composition increase efficiency
See 0437

CATHETERS
New System For Administering Chemotherapy Is Developed
See 0874

CATHODE RAY TUBES
Microcomputer Multiplexes Alphanumeric Labels on CRT's: External, low-power alphanumeric label generator eliminates costly video circuitry
See 0055
Microcomputer Multiplexes Alphanumeric Labels on CRT's: External, low-power alphanumeric label generator eliminates costly video circuitry
See 0269

CATHODES
Carbonate Fuel-Cell Cathode: Method for preparing porous cathode provides structural integrity and improved performance
See 0307
Cathode Corrosion in Lithium/ulfuryl Chloride Batteries: Causes and cures of short shelf life are examined
See 0308

CAVING MINING
Headgate to Tailgate Cutting Lowers Longwall Shearer Operators' Dust Exposure
See 0912

CDTE SEMICONDUCTOR DETECTORS
Hand-Held Field Spectrometer: Portable spectrometer employs microprocessor to provide extended analysis of radiation sources
See 0936

CELL LINES
Hybridoma Data Bank Available
See 0863

CELLS(BIOLOGY)
Detecting Abnormal Cells by Fluorescence: Analysis by two matched stains is fast and accurate
See 0853
Method of Continuous Production of Retroviruses (HTL V-III) from Patients with AIDS and pre-AIDS
See 0868

CELLULAR GLASS
Fabrication of Structural Cellular Glass: A surface layer is quickly heated and compressed
See 0777
Freeze/Thaw Properties of Cellular Glass: Without moisture, temperature cycles do no harm
See 0783

CEMENT ADDITIVES
Magnesium Polyphosphate Cement Concrete: Concrete repair material for use under wet conditions and temperature extremes
See 0150

CEMENTS
Compatibility of Grouts with Hazardous Wastes
See 0389
Epoxy Grout With Silica Thickener: Grout cures quickly, even in the presence of hydraulic oil
See 0773

CENTERS FOR DISEASE CONTROL
New Standard Antibody Sera Are Now Available From CDC
See 0873

CENTRIFUGING
Small Diameter Pumps for In Situ Leaching
See 0714

CERAMIC COATINGS
Erosion-Resistant Composite Material and Method For Preparation
See 0774

CERAMICS
Absorbable-Susceptor Welding of Ceramics: The susceptor would become part of the joint
See 0592
Ceramic Solar Receiver: Matrix concept offers efficient heat transfer at high temperatures
See 0309
Ceramic 1,500C Test Furnace: Unit is inexpensive, easy to construct, and requires little power to operate
See 0455
Ceramics for Solar Receivers: Materials for high-temperature use are reviewed
See 0310
Flexure Test for Ceramic Materials: Standards for accurate bend-testing are established
See 0781
Gas-Pressure Sintering Process: High-performance silicon nitride ceramics are produced
See 0644
Glass Ceramics, Shape Memory, and Ferroelectric Materials: Report presents three results from materials studies
See 0784
High-Strength Structural Ceramics: Microstructural flaws are reduced by a new process for making silicon carbide
See 0786
Predicting Life of Ceramic Components in Gas Turbines: Experimental and analytical results are compared
See 0170
SiC-AIN Ceramics: New ceramic material for diesel engine application is characterized
See 0827
Silicon Carbide-Based Structural Ceramics: Process produces strong silicon carbide ceramics
See 0828
Suppression of Dielectric Breakdown of Insulators at High Temperatures
See 0296

CHAIRS
Portable Dental Chair Functions as a Total Care Unit
See 0881

CHEMICAL ANALYSIS
Analysis of Polynuclear Aromatic Hydrocarbons in Particulate Matter by Luminescence Techniques
See 0381
Analytical Methods for Synfuel Production: Techniques sometimes produce differing results from laboratory-to-laboratory
See 0087
Analytical Procedures for Aniline and Selected Derivatives in Wastewater and Sludge
See 0382
Aqueous Solution Standard Reference Materials Are Being Developed
See 0451
Characterization of Elastomer Vulcanizate Materials: Pyrolytic gas liquid-phase chromatography (PGC) identifies elastomers in sealing and connecting components of hydraulic system
See 0752
Development, Design, and Operation of a Cascade Impactor
See 0470
Improving Hydrocarbon Separation in Gas Chromatography: Modified silica spheres enhance chromatographic separation
See 0105
Measuring Trace Hydrocarbons in Silanes: The technique is rapid and uses standard analytical equipment
See 0111
Monitoring Lignin Content in Paper Processing: Feedstock and finished pulp can be analyzed and controlled automatically
See 0114
Negative Ion Chemical Ionization Mass Spectroscopy (NICIMS) Successfully Detects Trace Compounds
See 0115

A New Class of Chemical Labels Has Been Developed
See 0118

New Portable Instrument Measures CO in Blood
See 0060

Optimization of Liquid-Liquid Extraction Methods for Analysis of Organics in Water
See 0121

Petroleum Crude Oil Reference Material Available
See 0124

Quantitative Analysis of Fire-Resistant Fuel: Spectrophotometry monitors proportions of fuel, emulsifier, and water
See 0361

Resonance Ionization Mass Spectrometry
See 0131

Resonance Ionization Mass Spectrometry
See 0557

Standards For Toxic Metals In Human Urine Are Developed
See 0133

Suitcase-Sized Portable Microbiology and Clinical Laboratories Developed
See 0566

Totally Optical Technique for Monitoring Ambient Non-Methane Hydrocarbons
See 0576

Vibrating Electrode System Improves Trace Element Detection
See 0140

CHEMICAL COMPOUNDS

New Liquid Compound Separation Technique Developed
See 0119

CHEMICAL EQUILIBRIUM

WATEQF - A FORTRAN IV Version of WATEQ, a Computer Program for Calculating Chemical Equilibria of Natural Waters (1984 Version)
See 0141

CHEMICAL EXPLOSIVES

Environmental Hazards of TNT: Reactions between TNT and soil components are discussed
See 0398

CHEMICAL FEEDSTOCKS

Chemical Feedstocks From Coal: Ethylene and other hydrocarbons are produced from an economically feasible process
See 0091

Short-Rotation Forestry: Current state-of-the-art and future research topics are described
See 0931

CHEMICAL LASERS

Fluorine Mixer/Vaporizer for Chemical Lasers: The fluorine is vaporized by a flow of helium
See 0968

CHEMICAL PROCESSORS

Processor Generates and Extracts Silicon: An impinging jet/funnel system separates the silicon and salt formed in the reduction of silicon tetrachloride by sodium
See 0130

CHEMICAL REACTION MECHANISMS

Accelerating Epoxy-Resin Curing: Trisubstituted ureas simplify the curing process and speed it up
See 0085

CHEMICAL REACTIONS

Interface Reactions in Metal-Matrix Composites: An intermediate layer between fiber and matrix determines the mechanical properties of the composite
See 0792

Photoacoustic Spectroscopy of Chemical Reactions: Technique yields information on polymerization and electrochemical reactions
See 0125

CHEMICAL REACTORS

Sodium Spray Would Speed Silicon Production: The production rate of solar-grade silicon in a sodium/silicon tetrafluoride reactor would be increased by a spray feed
See 0132

Stirred Reactor Dynamics: Effects of the vortex induced by a stirrer are examined
See 0135

Two-Temperature-Zone Silicon Reactor: Temperature profile confines SiF4 reduction by sodium to the reactor bottom
See 0138

CHEMICAL SPILLS

Bromination Process for Disposal of Spilled Hazardous Materials
See 0387

Mobile System for Extracting Spilled Hazardous Materials from Excavated Soils
See 0411

Three New Techniques for Floating Pollutant Spill Control and Recovery
See 0436

CHEMICAL VAPOR DEPOSITION

Metal Coating Multifilamentary Yarns: Process provides uniformly coated fibers for reinforcing high-temperature composites
See 0802

CHEMOTHERAPY

New System For Administering Chemotherapy Is Developed
See 0874

CHILDREN

New Monitor Allows Evaluation of Hyperactive Children
See 0059

CHLORINATION

Desulfurizing Coal by Chlorinolysis and Hydrogenation: A two-process combination removes more sulfur than either process alone
See 0391

CHROMIUM COATINGS

Plating Process to Improve Use of Chromium Has Been Developed
See 0683

CHROMOSOMES

First Artificial Chromosome Constructed: Promises New Insight into Birth Defects
See 0857

Spontaneous Changes in Chromosomes May Be First Detectable Event in The Onset of Tumorigenesis
See 0889

CINEMATOGRAPHY

Flash X-Ray Cineradiography: Framing rates up to 100,000 frames per second are possible to record fast events
See 0950

CIRCUIT BOARDS

Detecting Defective Solder Bonds: The method is noncontact and nondestructive
See 0618

Fire-Resistant Composites: A resin blend produces high-char-yield, low-smoke composites
See 0780

Measuring Coating Thickness: A gage measures the coating thickness in holes
See 0515

CIRCUIT BREAKERS

Solid-State dc Circuit Breaker: Two-terminal unit acts like a resettable delay fuse
See 0291

CIRCUITS

Computer Models for IC Fabrication: Process simulations are described for computer-aided design
See 0607

Computer Models for VLSI Fabrication Processes: A completely new, advanced computer program is now available
See 0608

Digital Phase-Shift Standard: Circuit using just three IC's could be used to perform precise calibration
See 0472

Digital Single-Phase Power-Factor Controller: Digital circuit has faster response to load changes
See 0234

Effect of Cosmic Rays on MSI Devices: Low-power logic devices are susceptible to cosmic-ray particles
See 0236

Effects of Heavy-Charged Particles on MOS IC's: Although such particles are not troublesome now, they could be in the future
See 0237

High-Density Printed Wiring: Channel plating provides thin, closely spaced conductors
See 0252

Improved High-Current Drive Circuit: It uses a VMOS field-effect power transistor
See 0258

Inductive-storage and transfer system provides control of pulse characteristics at high power levels
See 0261

Insulated-Metal Substrates for Hybrid Integrated Circuits: Mass-production potential is evaluated
See 0262

Low-Cost Alternatives in Hybrid Microcircuit Packaging: Adhesive sealing, nickel plating, and multiwire boards are evaluated
See 0669

Low-Temperature Water Diffusion in SiO2 Thin Films: Nuclear-resonance profiling looks into the formation mechanism of IC thin films
See 0109

Modernized Electronic Manufacturing Facility: Fabrication and testing capabilities are described
See 0272

New Program Will Analyze Microelectronic Test Data
See 0274

Printed Circuit Converts RF Energy to dc Power: An ultra-light-weight, large-area, antenna/rectifier has 85 percent conversion efficiency
See 0281

Probe Array for Testing Printed-Circuit Substrates: Spurious conduction paths are found by an array of miniature test probes
See 0688

Programable Power Conditioner: It accepts a range of inputs and produces a range of outputs
See 0283

Rapid Circuit Breadboarding: The cost of a one-of-a-kind circuit board would be reduced
See 0284

Reworking Packaged Hybrid Microelectronic Circuits: Equipment and processes have been developed for fast and economical delidding and resealing
See 0705

Superefficient VAR Controller: A superconducting coil controls reactive power with minimal loss
See 0295

Test Pattern for IC's: Random-fault densities are measured in an array of standard structures
See 0570

VLSI Unit for Two-Dimensional Convolutions: Proposed chip could be used for a variety of functions
See 0223

CLAMPS

Plastic Clamp Retains Clevis Pin: A plastic clamp requires no special installation or removal tools
See 0681

Tool for Tightening Bolts With Knurled Heads: A modified clamp transfers a torque to the bolthead
See 0732

CLAMS

Cage Culture of Yearling Surf Clams
See 0022

CLASSIFIERS

Classifying Particles by Acoustic Levitation: Separation technique is well suited to material processing
See 0603

CLEANING

Adhesive Removal From Protective Clothing: An electric eraser removes butyl cement from protective coveralls
See 0745

Robotic Water-Blast Cleaner: Automated system will be fast, safe, and efficient
See 0707
Self-Cleaning Tubular-Membrane Module: Cleaning proceeds continuously, without hindering processing
See 0825

CLEANING AGENTS
Walnut Hulls Clean Aluminum: Hulls inflict minimal substrate damage
See 0840

CLEAR AIR TURBULENCE
Searching for Clear-Air Turbulence: An airborne microwave system would locate the tropopause to assist in the avoidance of clear-air turbulence
See 1019

CLINICAL MEDICINE
Clinical Mass Spectrometers Are Now Available
See 0458
Sickle Cell Anemia: New Approaches To Therapy
See 0886
Suitcase-Sized Portable Microbiology and Clinical Laboratories Developed
See 0566

CLONES
Gene Cloning May Sprout Super Seeds
See 0862

CLOSTRIDIUM BOTULINUM
Smoked Fishery Products: Increasing Safety and Acceptability
See 0031

CLOTHING
Effectiveness of Cooling Garments: Water-cooled vests with portable heat exchangers are evaluated
See 0046
Evaluation Tests for Cold-Weather Clothing: Performance and durability are measured
See 0047
Heat Absorbing Gel Developed
See 0050

COAL
Catalyst for Hydrogenation of CO: An improved catalyst reduces the costs of separating olefins from paraffins
See 0089
Chemical Feedstocks From Coal: Ethylene and other hydrocarbons are produced from an economically feasible process
See 0091
Colloidal Liquid Fuel: Heavy petroleum fractions are extended with coal particles to form a pumpable fuel
See 0311
Enthalpy of Coal Fluids: Thermodynamic model aids in simulation of synthetic fuel processes
See 0098
Supercritical-Multiple-Solvent Extraction From Coal: Large and small molecules dissolve different constituents
See 0137

COAL CONVERSION
Monitoring the Thickness of Coal-Conversion Slag: Proposed technique adapts analogous ocean-floor-mapping technology
See 0415

COAL DEPOSITS
Improved Coal-Thickness Measurement: Summed signals and a dielectric-filled antenna improve the measurement
See 0915

COAL FIRED POWER PLANTS
Managing Coal-Combustion Wastes: A variety of options is explored in a guidebook
See 0409

COAL GASIFICATION
Improvements in Gamma-Ray Coal-Level Sensors: Instrumentation is evaluated at an existing coal-gasification facility
See 0497
Lockhopper Valves for Coal Gasifiers: Better valves are under development
See 0666
A Modular Transportable Process Development Unit For Wastewater Treatment Polishing Studies
See 0414
Molten Slag Would Boost Coal Conversion: A proposed reactor would increase the residence time of unconverted char
See 0676
Pressure Reducer for Coal Gasifiers: Multistage device resists the action of hard particles entrained in gas
See 0128
Simulating Transportation and Storage in Coal Refining: Computer model analyzes hypothetical situations and highlights problems
See 0431
Waste Disposal at Synthetic-Fuel Plants: Disposal is examined from engineering, environmental, and economic viewpoints
See 0442

COAL LIQUEFACTION
Enthalpy of Coal Fluids: Thermodynamic model aids in simulation of synthetic fuel processes
See 0098
Simulating Transportation and Storage in Coal Refining: Computer model analyzes hypothetical situations and highlights problems
See 0431
Treating Wastewater From Coal Liquefaction: Treatment process reduces pollutant concentrations below EPA levels
See 0439

COAL MINES
Better Performance from Line and Check Curtains
See 0895
Draining Methane From Coal Mines: Removing gas before coal is mined speeds up production
See 0904
Longwall Coal Mine Respirable Dust Sources
See 0407

COAL MINING
Automated Coal-Mine Shuttle Car: A cable-guided car would increase efficiency in underground coal mines
See 0894
Conveyor Belt Service Machine
See 0898
Flexible Roof Drill for Low Coal: A rod-changer drill system increases drill-bit life by 300 percent
See 0909
Instrumented Pick Detects Coal/Rock Interface: Strain-gage signals indicate whether coal or rock is being cut
See 0918
Mechanical Coal-Face Fracturer: Radial points on a proposed drill bit would take advantage of the natural fracture planes of the coal
See 0919
Shuttle-Car System for Continuous Mining: Buffer storage catches the coal production between loadings
See 0932

COAL PREPARATION
Desulfurizing Coal by Chlorinolysis and Hydrogenation: A two-process combination removes more sulfur than either process alone
See 0391
Dynamic Simulation of Chemical Processes: A variety of software packages are evaluated
See 0393
Simulating Transportation and Storage in Coal Refining: Computer model analyzes hypothetical situations and highlights problems
See 0431
Stirred Reactor Dynamics: Effects of the vortex induced by a stirrer are examined
See 0135

COATERS
Portable Plating System: A 30-gallon system is transported on a mobile cart
See 0685

COATING PROCESSES
Improved Silicon-Growth Chamber: Improvements include a better transport mechanism and a better trough heater
See 0654
Nonliquid Process Prepares Plastics for Electroplating: Gaseous-phase preparation is much simpler than conventional liquid-phase preparation
See 0806

COATINGS
Compliant Coatings for Turbulent Drag Reduction Under Development
See 0939
Erosion-Resistant Composite Material and Method For Preparation
See 0774
Making Thermoplastics Flame-Resistant: Elastomer-coated hydrate salts are added
See 0796
Measuring Coating Thickness: A gage measures the coating thickness in holes
See 0515
Measuring Elastic Modulus of Sintered Metal: Technique minimizes the effect of the substrate on a thin sintered coating
See 0800
Studies of the Inverted-Meniscus Deposition of Silicon on Ceramic: Controlled temperature profiles are essential to the production of solar cells
See 0836
Wicking Coating for Heat Pipes: Grooves in a porous coating are produced by flame-spraying over a wire mesh
See 0740

COBALT ALLOYS
Rare Earth/Cobalt Permanent Magnets: Magnets allow significant simplifications in circuit design
See 0285

COCHLEA
Cochlear Implants May Allow Some Deaf People To Hear
See 0042

CODERS
NRZ Data Asymmetry Corrector and Convolutional Encoder: Circuit compensates for timing, amplitude, and symmetry perturbations
See 0184
NRZ Data Asymmetry Corrector and Convolutional Encoder: Circuit compensates for timing, amplitude, and symmetry perturbations
See 0185

CODING
Coding for Single-Line Transmission: Scheme for code generation and conversion has only modest equipment requirements
See 0178

COLD WEATHER CONSTRUCTION
Dual-Phase Steel for Low-Temperature Application: Study characterizes the suitability of this steel for Arctic-temperature applications
See 0771

COLD WEATHER OPERATIONS
Army Publishes Cold Weather Fuel Guide
See 0302

COLD WEATHER TESTS
Evaluation Tests for Cold-Weather Clothing: Performance and durability are measured
See 0047

COLLISION RESEARCH
Energy Absorption in Composite Materials: Crash-resistance potential is found in these materials
See 0772

COLLOIDS
Colloidal Liquid Fuel: Heavy petroleum fractions are extended with coal particles to form a pumpable fuel
See 0311

COMBUSTION

Acoustic Emissions Reveal Combustion Conditions: Turbulent-flame acoustic emissions change with air/fuel ratio variations
See 0159

How Synfuels Behave in Gas Turbines: Combustion products can be different from those of petroleum-based fuels
See 0338

COMBUSTION CHAMBERS

A Multifuel, Low-Emission Gas Turbine: Variable-area air injector improves efficiency at all power levels
See 0416

COMBUSTION CONTROL

Controlling Explosives With Microbes: A micro-organism removes nitrate ester groups from grains
See 0852

COMFORT

Effectiveness of Cooling Garments: Water-cooled vests with portable heat exchangers are evaluated
See 0046

Heat Absorbing Gel Developed
See 0050

COMMUNICATING

Portable Communicator Has Been Developed for Non Vocal People
See 0062

COMMUNICATION CABLES

Two-Wire to Four-Wire Audio Converter: A simple circuit provides an interface between normally incompatible voice-communication lines
See 0191

COMPENSATORS

Torque Compensator for Mirror Mountings: Device nulls flexural distributions of pivotal torques
See 0735

COMPLEX COMPOUNDS

Calcium-Free Asbestos for Fuel Cells: An organic-acid salt removes unwanted calcium without weakening the asbestos
See 0306

COMPLIANT COATINGS

Compliant Coatings for Turbulent Drag Reduction Under Development
See 0939

COMPOSITE FABRICATION

Design and Fabrication of Composite Tail Rotor Components: Composites provide higher strength and lower weight
See 0616

Fabrication of Graphite/Epoxy Column Elements: Dimensionally precise columns are wound on vertical mandrels
See 0776

COMPOSITE MATERIALS

Acoustic Design Improves Composite Impact Resistance: Composite acoustic response to impact should be included in design criteria
See 0743

Acoustic-Emission Methods for Composite Materials: Techniques can be used for quality control and nondestructive evaluation
See 0448

Analytical Methods for Glass-Fiber-Reinforced Composites: Techniques for quality control are reviewed
See 0746

Battery Grid for Submarines May Have Industrial Uses
See 0748

Characterization Methods for Composite Reliability: Chemical, physical and mechanical tests are described
See 0751

Characterization Techniques for Composite Materials: State-of-the-art methods are presented
See 0753

Characterizing Epoxy Matrices for Composites: A variety of testing techniques used in combination yield information useful for quality control
See 0754

Cumulative Fatigue Damage in Composites: The extent of damage is correlated with remaining life expectancy
See 0765

Determining the Orientation of Anisotropic Materials: Ultrasonics probe the direction of tile fibers
See 0466

Eddy-Current Damage Test for Carbon Composites: A nondestructive test method detects cracks in materials of low conductivity
See 0475

Electronic Dilatometer: A nonclamping micrometer measures small strains
See 0479

Energy Absorption in Composite Materials: Crash-resistance potential is found in these materials
See 0772

Erosion-Resistant Composite Material and Method For Preparation
See 0774

Fabrication of Graphite/Epoxy Column Elements: Dimensionally precise columns are wound on vertical mandrels
See 0776

Fire-Resistant Composites: A resin blend produces high-char-yield, low-smoke composites
See 0780

Forming Mirrors on Composite Materials: Smooth coatings are deposited on hard-to-polish substrates
See 0969

Graphite/Epoxy Tow Bar: Composite bar is as strong as a conventional steel automotive tow bar
See 1012

Interface Reactions in Metal-Matrix Composites: An intermediate layer between fiber and matrix determines the mechanical properties of the composite
See 0792

Low-Weight Inserts for Aluminum Honeycomb Panels: Fiber/epoxy composites would be used in place of solid aluminum
See 0795

Modified Oscillograph for Impacting Composite Materials: A commercial instrument is modified to impart energy in a realistic manner
See 0531

More-Uniform Heat Curing for Structural Repairs: A copper lining helps to distribute the heat under a heating blanket
See 0805

Predicting Thermal Conductivity: An empirical equation accurately predicts thermal conductivity in insulating materials
See 0811

Properties of Wet Kevlar/Epoxy Composites: Wet and dry materials are compared and reasons for differences are explored
See 0816

Shielding Effectiveness Measuring Techniques Are Investigated
See 0826

Singularities in Laminated Composites: Stress concentrations at free edges and contact edges are analyzed
See 0829

Stronger Carbon Fibers for Reinforced Plastics: New process makes fibers 70 percent stronger at lower carbonization temperatures
See 0835

Thermographic Testing of Composite Materials: Techniques and equipment are reviewed
See 0574

Wet-Filament Winding Process: Composite-manufacturing method offers versatility
See 0842

COMPRESSIBLE FLUIDS

Increasing Fluid Compressibility With Plastic Spheres: Suitability of various sphere materials is evaluated
See 0790

COMPRESSION TESTS

J-Channel Locks Potting to Compression Panel: Panel ends are supported to prevent edge failure during testing
See 0503

COMPRESSORS

Axial Compressor Design and Analysis: Program yields blade configurations and aerodynamic flow fields
See 0594

Design of Multistage Axial-Flow Compressors: Computer program develops blading geometry and performance parameters
See 0617

COMPUTER AIDED DESIGN

CAD/CAM for Foundry Castings: High-quality steel-sand castings can be made quickly, inexpensively, and accurately
See 0598

Computer Models for IC Fabrication: Process simulations are described for computer-aided design
See 0607

Initial Graphics Exchange Specification For Solid Models Is Extended
See 0657

Interactive Graphics Analysis for Aircraft Design: Aircraft geometry is displayed on an interactive terminal
See 0011

Linear Control System Design Analysis
See 0263

Solutions of Transonic Flow in Turbomachines: Accurate approximations are obtained using perturbation techniques
See 0717

COMPUTER AIDED MANUFACTURING

Buyer's and User's Guide to Flexible Manufacturing Systems: Detailed advice is offered on acquiring a system, installing it, and operating it
See 0597

CAD/CAM Techniques for Forging Spiral Bevel Gears: Machining time and costs are substantially reduced
See 0599

Flexible Manufacturing Systems: Strategies for improving productivity with computers are presented
See 0639

Initial Graphics Exchange Specification For Solid Models Is Extended
See 0657

Integrated Computer Aided Manufacturing (ICAM) Quality Assurance Modeling and Analysis Assures Quality Products
See 0660

Requesting and Preparing Proposals: Samples provide guidance on form and content
See 0700

Robotic Off-Line Programming Applications Is Demonstrated
See 0706

Technology for Flexible Manufacturing: Key subsystems are described
See 0724

COMPUTER APPLICATIONS

Advanced System for Process Engineering
See 0086

Air Force Develops Subjective Workload Assessment Technique
See 0040

Air Land Water Analysis System (ALWAS): A Multi-Media Model for Toxic Substances
See 0379

Analysis of Short-Rotation Forests: Economic strategies are evaluated
See 0892

Asbestos Removal And Disposal Information System
See 0385

Automatic Flowsheet Layout: Software package provides instructions for an automatic drawing machine
See 0193

COMPUTER APPLICATIONS

Axial Compressor Design and Analysis: Program yields blade configurations and aerodynamic flow fields
See 0594

Boundary-Layer Equations for Two-Dimensional and Axisymmetric Flow: Finite-difference procedure solves for laminar, transitional, or turbulent flows
See 0957

BURST - A Computer Program of a Meteor Burst Communications Model Used to Predict the Reliability of a Communications System That Uses Meteor Bursts as the Communications Channel
See 0177

Calculating the Flow Field in a Radial Turbine Scroll: Finite-difference and finite-element methods give glow solutions
See 0160

Compressible Flow About Wind Turbine Blades: Program solves the three-dimensional potential equation for flow through an arbitrary rotor
See 0313

Compressible Stability Analysis Code for Transition Prediction in Three-Dimensional Boundary Layers: Black box code for swept and tapered wings
See 0005

Computer Aided Structural Engineering Project Develops
See 0070

Computer Analysis of Eye Blood-Vessel Images: Technique rapidly diagnoses diabetes mellitus
See 0043

Computer Model Developed to Help Predict Solutions to Electrostatic Precipitators Problems
See 0390

Computer Program Available To Calculate Fluid Properties
See 0094

Computer Program for Chemically Reactive Fluid Flow: Program solves the equations of transient multicomponent chemically reactive fluid dynamics
See 0960

Computer Program Simulates Room Fires and Estimates Safet Egress Time
See 0071

Computer Program Uses Fundamental Neuroanatomy as the Basis for Interpreting Patient Data
See 0850

Computer Programs Have Been Developed for Nonlinear Least Squares
See 0194

Computer Readability Editing System Developed
See 0195

Configuration Analysis Tool: An interactive program for storing information and generating reports on project configuration management
See 0196

Crash Simulation and Nonlinear Structural Analysis: Behavior of structures composed of trusses, frames, and membranes is modeled
See 0006

Design of Multistage Axial-Flow Compressors: Computer program develops blading geometry and performance parameters
See 0617

Determining Aircraft Altitude: Image motion and aircraft speed determine altitude
See 0007

Dissociated Airflow Effects During Plasma-Arc Testing: Program computes heating rates and surface-friction effects
See 0008

Electronic Score Pad Developed
See 0949

Extended Vortex Lattice Method: Aerodynamic characteristics are determined for up to four complex planforms
See 0009

Fast Electronic Solar-Cell Tester: Microcomputer-controlled system gathers current and voltage data
See 0483

Fast Generation of Boundary-Conforming O-Type Grids: Algorithm generates grids for arbitrary wing-body and axial turbomachinery geometries
See 0010

Figuring Residential Energy With Pocket Calculator: Consumption for heating and cooling can be calculated quickly and easily
See 0329

Flexible Method for Analyzing Bird Band Recovery Data
See 0858

Flow Over Nonaxisymmetric Nozzles: Code solves three-dimensional Navier-Stokes equations
See 0966

Flow Through a Rotating Turbomachinery Blade Row: Full potential, transonic quasi-three-dimensional flow is calculated
See 0163

Forest Resource Information System: Twenty-three processing functions aid in utilizing LANDSAT data for forest resource management
See 0910

Generating Random Number Pairs: An algorithm generates pairs drawn from a bivariate normal distribution
See 0201

Imaging Bubble Formation In a Drop Tube: The entire process is under control of a computer
See 0951

Instrument is Developed for Ramp Injection of Radiotracers for Blood Flow Measurement by Emission Tomography
See 0052

Interactive Graphics Analysis for Aircraft Design: Aircraft geometry is displayed on an interactive terminal
See 0011

Lift Effect of Cambered Calculating the Vortex-Wings: Program computes the vortex-lift effect by using an improved supersonic suction analogy
See 0012

Linear Control System Design Analysis
See 0263

Liquid Pathway Dose Calculations (LADTAP2)
See 0866

Low-Temperature Reactions for Waste Disposal: Toxic wastes can be made with low energy expenditure and small capital investment
See 0408

Mathematical Model of Electrostatic Precipitation for the Texas Instruments Programmable 59 Calculator
See 0410

Memory-Efficient Energy Network Has Been Developed
See 0355

Microcomputer Multiplexes Alphanumeric Labels on CRT's: External, low-power alphanumeric label generator eliminates costly video circuitry
See 0055

Microprocessor-Based Neural-Pulse-Wave Analyzer: Contributions from several nerve units are identified and separated
See 0056

Minimum Induced Drag of Nonplanar Wings: Numerical optimization techniques calculate the required bound-circulation distribution
See 0013

Monte Carlo Investigation of Trajectories: Orbital sequences are modeled, simulation statistics generated, and user-requested variables scanned
See 1004

New Program Will Analyze Microelectronic Test Data
See 0274

New Technology Stretches Scarce Water for Irrigation
See 0028

Non-linear Regression Program Developed
See 0211

Non-Linear Regression Program Fits Data to Non-Linear Models: Personal Microcomputers Used
See 0212

Nonlinear Stress Concrete Structures Program
See 0078

Off-Design Turbine Modeling: Off-design efficiency and flow function are obtained from design-point input data
See 0166

PANEL Code for Planar Cascades: Plane cascade flow is solved using improved surface-singularity methods
See 0169

PCG Software for Producing Computer Graphs
See 0213

Precise Measurement of Effective Focal Length: Computerized instrument measures effective focal lengths to 0.01 percent accuracy
See 0549

Predicting Aircraft Noise Levels: Program predicts noise levels from data on fan, combustor, turbine, and airframe sources
See 0017

Processing and Enhancement of Weather Radar Data
See 0036

Random Life Curves for Common Engineering Materials: Program incorporates non-Rayleigh effects in evaluating structure life
See 0984

Remote Manipulator Has Realistic Feel: The operator feels the load but not the manipulator inertia or friction
See 0697

Robotic Control System for Excavation Equipment: Full automation offers great flexibility
See 0154

Sharp-Focus Composite Microscope Imaging by Computer: Enhanced depth of focus aids medical analysis
See 0561

Shock-Free Airfoil Cascades: Fast design and analysis uses fictitious gas concept
See 0988

Short-Rotation Forestry: Current state-of-the-art and future research topics are described
See 0931

Shuttle Communications Blackout Study: The RF power loss through a three-dimensional plasma sheath is computed
See 0190

Shuttle Inventory Management: All supply activities and requirements are controlled from a single point
See 1007

Simulating Mechanical Control Operations: A computer model can simulate mechanical harvesting operations using any specific mechanical system operated in any realistic environment
See 0887

Software For Image Manipulation
See 0217

Solar Energy Studies Computer Program Developed
See 0081

Solutions of Transonic Flow in Turbomachines: Accurate approximations are obtained using perturbation techniques
See 0368

Solutions of Transonic Flow in Turbomachines: Accurate approximations are obtained using perturbation techniques
See 0717

Spare Parts Inventory Control System Software
See 0221

Steady, Nonrotating, Blade-to-Blade Potential Transonic Cascade Flow Analysis Code: Program numerically solves an artificially time-dependent form of the actual full-potential equation
See 0991

Subcritical Wing Design Code: program uses higher-order far-field drag minimization
See 0018

Submillisecond Optical Knife-Edge Testing: Data are sampled much faster than the optical system drift rate
See 0565

Technology for Flexible Manufacturing: Key subsystems are described
See 0724

Thermal Elastohydrodynamic Lubrication of Spur Gears: Program and analysis predict lubricant film thickness and the variations of dynamic load and temperature
See 0838

Thermal Modeling of Bridgman Crystal Growth: Heat flow is modeled for a moving or stationary rod-shaped sample inside a directional-solidification furnace
See 0994

Thermal Radiation Model Renodalization: Simplified radiation models reduce programing cost
See 0995

Time-Domain Modal Vibration Identification: Natural frequencies, damping factors, and damped mode shapes are identified
See 0996

Tool For Rangeland Management and Research Is Developed
See 0032

Transonic, Axisymmetric Flow Over Nozzle Afterbodies With Supersonic Jet Exhuasts: Predictions require less computation than the Navier-Stokes solutions
See 0019

Two-Evaporator Refrigerator With Refrigerant Mixture: Results of optimization study are tested
See 0372

Vibration Analysis Reduces Computer Time: Calculation cost is reduced without loss of accuracy
See 0998

Video Disks Make Maps Manageable
See 0933

Visual Database Conversion Program Developed
See 0222

VLSI Unit for Two-Dimensional Convolutions: Proposed chip could be used for a variety of functions
See 0223

WATEQF - A FORTRAN IV Version of WATEQ, a Computer Program for Calculating Chemical Equilibria of Natural Waters (1984 Version)
See 0141

Wing Subsonic Aerodynamic Performance Estimates: Solution by iteration estimates performance of twisted and cambered wings of arbitrary planform
See 0020

COMPUTER GRAPHICS

Environmental Satellite Data Made More Effective
See 0034

Graphics Software for Block Diagrams: Versatile program makes generating complex diagrams easy
See 0202

Initial Graphics Exchange Specification For Solid Models Is Extended
See 0657

Interactive Computer Graphics Software: Program offers a wide variety of features
See 0207

PCG Software for Producing Computer Graphs
See 0213

Software Programs for Multiple-Line Plots: Superimposed plots of several data files can be made
See 0218

COMPUTER NETWORKS

Connecting Separate Computers to a Common Bus: A network bus adapter handles protocols for computer-to-computer communications
See 0197

COMPUTER PROGRAMMING

Software Specification Language: SSL translator aids in developing and checking software systems
See 0219

COMPUTER SECURITY

Guide Helps Evaluate Computer Security
See 0203

Security Package for the VAX: Four programs deal with intruders and resource management
See 0216

COMPUTER SOFTWARE MANAGEMENT

Large-Scale Software Management System: Changes are organized and controlled according to consistent procedures
See 0208

COMPUTER STORAGE

Extending the Memory of Microcomputers: Memory is increased while retaining real-time capabilities
See 0200

COMPUTER STORAGE DEVICES

Video Disks Make Maps Manageable
See 0933

COMPUTERIZED AXIAL TOMOGRAPHY

Instrument is Developed for Ramp Injection of Radiotracers for Blood Flow Measurement by Emission Tomography
See 0052

COMPUTERIZED SIMULATION

Computer Model Has Been Developed To Assist Orthopedic Surgeons
See 0849

Computer Models for VLSI Fabrication Processes: A completely new, advanced computer program is now available
See 0608

Computer Simulates Organogenesis
See 0851

A Heliostat Cost-Analysis Tool: A computerized model aids in the evaluation and comparison of heliostat cost estimates
See 0336

Modeling Landfill Methane Recovery: Two- and three-dimensional computer simulations are used for the analysis of gas recovery in landfills
See 0413

Value of Wind and Solar Thermal Energy: Computer programs allow utilities to determine overall electric-energy production costs
See 0375

COMPUTERS

Portable General Purpose Computer: Battery-operated, portable computer system features full computing capability on-site
See 0214

CONCRETE CONSTRUCTION

Low Cost Bridge Deck Surface Treatment
See 0149

Nonlinear Stress Concrete Structures Program
See 0078

CONCRETE POLYMER COMPOSITES

Quick-Setting Polymer Concrete: High strengths are obtained using a water-soluble binder
See 0153

CONCRETES

Low Temperature Concrete Mortar Properties Are Detailed
See 0509

Magnesium Polyphosphate Cement Concrete: Concrete repair material for use under wet conditions and temperature extremes
See 0150

New Superplasticizers Are Being Used In Concrete
See 0151

Quick-Setting Polymer Concrete: High strengths are obtained using a water-soluble binder
See 0153

CONGENITAL ABNORMALITIES

First Artificial Chromosome Constructed: Promises New Insight into Birth Defects
See 0857

CONSTRUCTION EQUIPMENT

Bituminous Equipment for Road Paving: Present and future areas of development are presented
See 0142

CONSTRUCTION MATERIALS

Insulation Deficiencies And Their Effects On Heat Loss In Housing
See 0076

Low Cost Bridge Deck Surface Treatment
See 0149

Preventing Moisture Damage to Bituminous Materials: Damage inhibitor is abundant in shale oil
See 0152

Quick-Setting Polymer Concrete: High strengths are obtained using a water-soluble binder
See 0153

CONTAINERLESS PROCESSING

Containerless-Processing Module: Specimens are melted, manipulated, and solidified without contact
See 0610

Quenching Alloys in Containerless Processing: Gas quenching would be combined with magnetic levitation
See 0693

CONTAINERS

Better Seals for Vacuum Bags: A roller tool spreads an even layer of adhesive
See 0749

Cage Culture of Yearling Surf Clams
See 0022

Gas-Bearing Crucible for Shot Tower: Device protects molten drops
See 0642

CONTAMINANTS

Effects of Outdoor Soiling on Photovoltaic Modules: Airborne contaminants degrade module performances
See 0322

Improving Trace-Ion Sensitivity: Background noise is reduced by some special precautions
See 0656

CONTINUOUS WAVE LASERS

Obtaining Pulses From a CW Laser: Two acousto-optic modulators operate in tandem
See 0979

CONTROL CIRCUITS

Digital Single-Phase Power-Factor Controller: Digital circuit has faster response to load changes
See 0234

Microcomputer Multiplexes Alphanumeric Labels on CRT's: External, low-power alphanumeric label generator eliminates costly video circuitry
See 0269

Superefficient VAR Controller: A superconducting coil controls reactive power with minimal loss
See 0295

Superefficient VAR Controller: A superconducting coil controls reactive power with minimal loss
See 0370

CONTROL EQUIPMENT

Controlling Sanding Depth: A mounting fixture for a rotary sander ensures a uniform finish
See 0614

Improved Magnetostrictive Materials Developed
See 0495

Phase Detector for Power-Factor Controller: Positive feedback assures reliable switching
See 0276

Phase Modulation Varies Average Acoustic Torque: Rotation of acoustically levitated objects can be controlled
See 0679

Power-Factor Controller With Fast Load Response: Sudden changes in induced emf are sensed
See 0280

Voice Operated Controls and Switches are Developed
See 0067

CONTROL SYSTEMS

Harmonic-Balance Algorithm for Nonlinear Systems: Limit cycles are identified in systems with multiple nonlinearities and multiple paths
See 0204

Linear Control System Design Analysis
See 0263

CONTROLLED ENVIRONMENTS

Aquaculture Methodology for Rearing Moluscs
See 0021

CONVEYORS

Conveyor Installation Tools
See 0899

Shuttle-Car System for Continuous Mining: Buffer storage catches the coal production between loadings
See 0932

CONVOLUTION
VLSI Unit for Two-Dimensional Convolutions: Proposed chip could be used for a variety of functions
See 0223

COOLING
Algorithm Developed For Best HVAC Start/top Times
See 0069
Effectiveness of Cooling Garments: Water-cooled vests with portable heat exchangers are evaluated
See 0046
Heat Absorbing Gel Developed
See 0050

COOLING SYSTEMS
Cooling by Para-to-Ortho-Hydrogen Conversion: A catalyst speeds the conversion, increasing the capacity of a solid-hydrogen cooling system
See 0095
Corrosion Inhibitor for Multiple-Metal Cooling Systems: Silicate/nitrite/borate formulation is compatible with aluminum, steel, copper, and other metals
See 0758
Criteria Has Been Established For Solar Heating And Cooling
See 0072
Improved Cooling System for Organic Dye Lasers: Complexity and expense are substantially reduced
See 0972

COPPER
New Findings On the Metabolism of Copper Are Released
See 0872

COPPER ALLOYS
Crack Initiation and Propagation in Alloys: Study characterizes mercury-embrittled aluminum, steel alloys, and brass
See 0762

COPPER AND COPPER ALLOYS
Wear Characteristics of Copper Alloys: Harder alloys show least wear
See 0841

CORROSION
Cathode Corrosion in Lithium/ulfuryl Chloride Batteries: Causes and cures of short shelf life are examined
See 0308
Corrosion Effects of Mixed Brake Fluids: Addition of new silicone brake fluid to conventional ones does not significantly increase corrosion
See 0757
Long-Term Corrosion of Zirconium Alloy: Data and a mathematical model are presented
See 0794
Marine Corrosion Work Continues
See 0797
Stress-Corrosion Cracking in Martensitic PH Stainless Steels: Precipitation-hardening alloys are evaluated in marine-environment tests
See 0833
Stress-Corrosion Cracking of Certain Aluminum Alloys: The SC resistance of new high-strength alloys is tested
See 0834
Ultrasonic Corrosion Monitor: Probe has resolution on the order of 0.004 mils
See 0839

CORROSION INHIBITORS
Corrosion Inhibitor for Multiple-Metal Cooling Systems: Silicate/nitrite/borate formulation is compatible with aluminum, steel, copper, and other metals
See 0758

CORROSION PREVENTION
Chromium Ion Implantation Can Prevent Corrosion in Steel Bearings Used in Navy Aircraft
See 0002
Corrosion-Prevention for Steel Stovepipes: Several materials were found to extend the service life significantly
See 0759
Materials for Fluorine-Rich Environments
See 0798
Reducing Drill Bit Wear Through Electrochemistry: A small source of electrical power downhole makes bits last longer
See 0694
Rhenium Prevents Corrosion: Thrust chamber is protected from corrosive fuel during burns
See 0821
Ternary Compound Electrodes for Molten-Salt Cells: Corrosion is reduced, and fabrication is simplified
See 0371

CORRUGATING
Curved Caps Raise Corrugation Strength: Construction concept would increase the strength-to-weight ratio of corrugated panels
See 0143

COSMIC RAYS
Effect of Cosmic Rays on MSI Devices: Low-power logic devices are susceptible to cosmic-ray particles
See 0236

COST ANALYSIS
Planning Transport and Manufacturing for Lowest Cost: A method originally developed for spacecraft path-planning is also applicable to transportation and manufacturing
See 0680

COST ESTIMATES
Cost Estimating Methods for Water Supply Planning Are Developed
See 0900
Costs of Batteries for Photovoltaic Power Systems: Installed and life-cycle costs for several technologies and applications are evaluated
See 0315
Production Cost Estimating: Interactive model combines learning-curve techniques with adjusted-unit cost methods
See 0689

COUPLERS
Low Loss Two-Signal Microwave Antenna Coupler
See 0265
Measuring Locomotive Drawbar Pull: A coupler pin becomes an accurate and rugged force sensor
See 0517
Optical-Fiber-to-Channel-Waveguide Coupler: A holding device is made by etching V-shaped grooves in silicon
See 0275

COUPLINGS
Flexible Coupling for Angle Transducer: Flexure strips ensure parallelism between input and output shafts
See 0638
Latching Mechanism for Umbilical Connectors: Connectors for power, data, and coolant are automatically mated
See 0664
Reusable High-Pressure Connector: Connector for tests at 9,000 psi requires only minimal modification to the free end of the fluid line
See 0704
Shape-Memory Couplings for Emergency Repairs: Damaged hydraulic lines can be repaired to nearly new condition
See 0712

CRACK PROPAGATION
Crack Growth and Toughness in TRIP Steel: Postulated rate equation integrated for specimen geometry is recommended as a method of analyzing crack growth
See 0760
Crack Initiation and Propagation in Alloys: Study characterizes mercury-embrittled aluminum, steel alloys, and brass
See 0762
Fatigue Life of Notched-Steel Specimens: Fatigue crack growth results are presented for a series of bending tests of high-strength, notched-steel specimens
See 0778

CRACKING(FRACTURING)
Crack Growth in Low-Alloy, High-Strength Steel: Model examines environmental and stress effects on crack growth
See 0761
Cracks in Glass Polymers Induced by Solvent Absorption: The combination of soluble particles and absorbed solvents cause polymer cracking
See 0763
Stress-Corrosion Cracking in Martensitic PH Stainless Steels: Precipitation-hardening alloys are evaluated in marine-environment tests
See 0833

CRACKS
Fatigue Strength of Pressurized Cylinders: Prestressing is found to improve fatigue resistance
See 0636
Stress-Corrosion Cracking of Certain Aluminum Alloys: The SC resistance of new high-strength alloys is tested
See 0834
Ultrasonic Detection of Fatigue Cracks: Report notes progress in ultrasonic characterization of crack growth
See 0579

CRASH RESISTANCE
Energy Absorption in Composite Materials: Crash-resistance potential is found in these materials
See 0772

CRASH TESTS
Crash Simulation and Nonlinear Structural Analysis: Behavior of structures composed of trusses, frames, and membranes is modeled
See 0006

CREEP TESTS
Creep Tests of Hot Aluminum Alloy: Results of 48-hour tests are presented
See 0764

CRUDE OIL
Microbial Enhancement of Oil Recovery: Bacteria aid in oil production and utilization
See 0921
Petroleum Crude Oil Reference Material Available
See 0124

CRYOGENIC REFRIGERATORS
Magnetic-Wheel Refrigerator: Magnetocaloric machine offers high efficiency and a wide range of cooling temperatures
See 0672

CRYOGENICS
Cryogenic Vacuum Pump: System provides high pumping capacity, even for noble gases
See 0615
Leak Tester for Cryogenic Flowlines: A gas chromatograph measures leakage into cavity surrounding the joint under test
See 0505
Level Sensor for Cryogenic Fluids: Comparator circuit is used with a hot-wire sensor
See 0507
Overview of Materials At Low Temperatures
See 0981
Sample Holder for Cryogenic Adhesive Shear Test: Five samples would be tested in one cooldown
See 0558

CRYSTAL GROWTH
Cold-Crucible Premelter for Silicon: A quartz crucible is refilled with molten silicon between crystal-growth cycles
See 0092
Gallium Arsenide Waveguide for Light: Molecular-beam epitaxy creates a structure having controllable properties
See 0970

Growing Crystals for Infrared Detectors: Unidirectional solidification yields bulk crystals with compositional homogeneity
See 0489

Growing Single-Crystal Sheets by Controlled Cooling: Immersed heating and cooling elements would establish the desired temperature gradients
See 0101

Improved Radiative Control of Ribbon Growth: Shield modifications enhance growth rate while reducing silicon oxide formation
See 0104

Low-Temperature Growth of SiC Single Crystals: Reasonable growth rates are obtained at 1,330 to 1,500C
See 0108

Melt-Level Sensing in Silicon-Web Growth: The shift of a laser beam reflected from the melt surface is sensed by a position detector
See 0675

Oscillating-Crucible Technique for Silicon Growth: Technique would yield better mixing of impurities and superior-quality crystals
See 0122

Pressure-Reduction Technique for Crystal Growth: Large crystals could be grown by varying the pressure rather than the temperature
See 0129

Starting Silicon-Ribbon Growth Automatically: A programable two-channel controller reproduces standardized growth conditions
See 0134

Thermal Modeling of Bridgman Crystal Growth: Heat flow is modeled for a moving or stationary rod-shaped sample inside a directional-solidification furnace
See 0994

CRYSTAL STRUCTURE

Determining Crystal Orientation by Laser Diffraction: Rapid, accurate method employs inexpensive equipment and requires minimal sample preparation
See 0962

CURING

Accelerated Curing of Epoxy Resins: Trisubstituted urea/epoxy mixture generates amine that lowers the curing temperature
See 0084

Accelerating Epoxy-Resin Curing: Trisubstituted ureas simplify the curing process and speed it up
See 0085

Improved Thermosetting Imide Resins: The modified resins have a lower curing temperature
See 0788

Measuring Epoxy-Curing Kinetics: Key reaction parameters are estimated from a single run
See 0110

More-Uniform Heat Curing for Structural Repairs: A copper lining helps to distribute the heat under a heating blanket
See 0805

Ultrasonic Blending of Epoxy Curing Agents: Method is fast, safe, and proven effective
See 0139

CUTTING

Drill-Pipe Severing Tool for Geothermal Wells: Explosive device is compatible with high borehole temperatures
See 0905

CUTTING MACHINES(TOOLS)

Materials Laboratory Demonstrates Automated Sheet Metal Blanking Cell
See 0674

CUTTING TOOLS

High-Speed Metal Removal: Ceramic inserts provide higher cutting speeds and longer life
See 0646

Tool Enlarges Hard-to-Reach Holes: Tool centers itself and cuts to a precise depth
See 0728

CZOCHRALSKI METHOD

Growing Single-Crystal Sheets by Controlled Cooling: Immersed heating and cooling elements would establish the desired temperature gradients
See 0101

Oscillating-Crucible Technique for Silicon Growth: Technique would yield better mixing of impurities and superior-quality crystals
See 0122

DAMAGE ASSESSMENT

Flood Damage Database Updating Uses LANDSAT
See 0145

DAMS

Spill Alert Device for Earth Dam Failure Warning
See 0156

DATA ACQUISITION

Portable Data Logger for Photovoltaic Panels: Instrument measures rapidly changing knee of V-I curve with extra care
See 0545

DATA BASES

Hybridoma Data Bank Available
See 0863

Visual Database Conversion Program Developed
See 0222

DATA PROCESSING

Digital Filters for Two-Dimensional Data: Computationally efficient filters speed the processing of two-dimensional experimental data
See 0199

Information-Systems Data-Flow Diagram: A single form presents a clear picture of an entire system
See 0206

Nearshore Sediment Transport Study, Torrey Pines Experiment
See 0943

DATA PROCESSING SECURITY

Guide Helps Evaluate Computer Security
See 0203

Security Package for the VAX: Four programs deal with intruders and resource management
See 0216

DATA TRANSMISSION

Fiber-Optic Instrumentation Link: Data transmission is immune to interference
See 0181

NRZ Data Asymmetry Corrector and Convolutional Encoder: Circuit compensates for timing, amplitude, and symmetry perturbations
See 0184

NRZ Data Asymmetry Corrector and Convolutional Encoder: Circuit compensates for timing, amplitude, and symmetry perturbations
See 0185

DAYLIGHTING

Daylighting Can Cut Energy Use
See 0073

DEAF PERSONS

Portable Communicator Has Been Developed for Non Vocal People
See 0062

DEAFNESS

Cochlear Implants May Allow Some Deaf People To Hear
See 0042

DEBURRING

Electrochemical Deburring: Machining burrs are removed from inaccessible areas
See 0626

Electrochemical Deburring: The technical and economic capabilities of the process are characterized
See 0627

DECONTAMINATION

Blowing Dust Away With Electrostatic Wind: Ionized air molecules drive away contaminants
See 0226

DEFIBRILLATORS

Implanted Defibrillator Improves Survival Rate of Cardiac Patients
See 0051

DEGASIFICATION

Dissolving Bubbles in Glass: An analytical expression calculates the changes of bubble radius with time
See 0769

DEGASSING

Draining Methane From Coal Mines: Removing gas before coal is mined speeds up production
See 0904

Flash Degasser for Geothermal Fluid: Energy-conversion efficiency is increased for geothermal powerplants
See 0330

DENITRIFICATION

Formation of Nitrosamines Under Denitrification Conditions: Microbial denitrification systems may produce toxic, carcinogenic nitrosamines
See 0402

DENSITY(MASS/VOLUME)

Charged-Particle Flux Sensor: Improved design has greater collection efficiency
See 0456

Controlling Metal-Halide Vapor Density in Lasers: Streams of buffer gas convect and dilute the metal-halide vapor
See 0961

Determining Frost Depth and Density: A simple device determines frost density from the volume of the melted frost
See 0464

DENTAL EQUIPMENT

Acoustic Tooth Cleaner: An acoustically-energized water jet aids in plaque breakdown
See 0038

Portable Dental Chair Functions as a Total Care Unit
See 0881

DEOXYRIBONUCLEIC ACIDS

NIAID Researchers Create Potential Live, Recombinant Virus Vaccine
See 0876

DESULFURIZATION

Desulfurizing Coal by Chlorinolysis and Hydrogenation: A two-process combination removes more sulfur than either process alone
See 0391

Dynamic Simulation of Chemical Processes: A variety of software packages are evaluated
See 0393

New Insights Into Recirculating Bed Reactors: Coal mixer modeling and coal hydrodesulfurization are examined
See 0417

DETECTION

Focal-Plane-Array Optical Proximity Sensors: Objects are detected at beam-axis intersections
See 0640

DETECTORS

Discriminating Between Liquid and Gas Flows: Variations in momentum density would change the position of a sensor
See 0474

DEUTERIUM FLUORIDE LASERS

Fluorine Mixer/Vaporizer for Chemical Lasers: The fluorine is vaporized by a flow of helium
See 0968

DEW

Rain and Dew Detector: Moisture between finger-like electrodes actuates a simple alarm circuit
See 0554

DEWATERING
Dewatering Peat With Activated Carbon: A proposed process should produce enough gas and carbon to sustain itself
See 0319
Solar Drying of Sludge: Greenhouse Versus Open Bed: The protection greenhouses afford against rain may not be necessary
See 0432

DIAGNOSIS
Computer Program Uses Fundamental Neuroanatomy as the Basis for Interpreting Patient Data
See 0850
New Tests for Gaucher's Disease Predict Nervous System Involvement
See 0875
NICHD-Supported Scientists Design Test for Prenatal Diagnosis of PKU
See 0877
Spontaneous Changes in Chromosomes May Be First Detectable Event in The Onset of Tumorigenesis
See 0889

DIAGNOSTIC AGENTS
Biochemical Markers Useful in Preventing Cancer and Cardiovascular Disease Developed
See 0845
Lead(203)-Tris-hydroxymethyl Aminomethane: A Radiopharmaceutical For Detection and Localization of Tumors
See 0865
New Chemical Markers of Septic Arthritis Have Been Identified in Bone-Joint Fluids
See 0871
New Standard Antibody Sera Are Now Available From CDC
See 0873
Researchers Produce a Tumor Localizing Agent
See 0884

DIAGNOSTIC EQUIPMENT
Computer Analysis of Eye Blood-Vessel Images: Technique rapidly diagnoses diabetes mellitus
See 0043
Digital Filter for Detecting Infectious Diseases: Low-speed, low-pass filter extracts information from noise-obscured data
See 0045
Heart-Rate and Breath-Rate Monitor: Off-the-shelf components measure physiological rates to an accuracy of 1 pulse/minute
See 0049
Serological Detection of Antibodies to HTLV-III in Sera of Patients with AIDS and pre-AIDS Conditions
See 0885
Ultrasonic Transceiver Has Been Developed To Analyze Orthopedic and Neurological Problems
See 0066

DIELECTRIC BREAKDOWN
Suppression of Dielectric Breakdown of Insulators at High Temperatures
See 0296

DIELECTRIC PROPERTIES
Dielectric Scanning Locates Voids in Glass Foam: Capacitive probes may succeed where X-ray and ultrasonic equipment do not
See 0471

DIESEL ENGINE EXHAUST
Diesel Particulate Destruction: A pulsed electrical discharge eliminates particulates in diesel exhaust
See 0392

DIESEL ENGINES
Alcohol/Petroleum Fuels for Diesel Engines: Blends of methanol, ethanol, water, and diesel fuels were formulated and evaluated
See 0300
Evaluation of Forklift Trucks: Four different types of forklift trucks are evaluated for productivity and economy
See 1011
Reducing Soot in Diesel Exhaust: Electrically charged fuel improves oxidation
See 0426
Retrofitting Diesels to Burn Alcohol: The problems and future potential of using ethanol as a fuel in diesel engines are discussed
See 0173
SiC-AIN Ceramics: New ceramic material for diesel engine application is characterized
See 0827

DIESEL FUELS
Army Publishes Cold Weather Fuel Guide
See 0302
Quantitative Analysis of Fire-Resistant Fuel: Spectrophotometry monitors proportions of fuel, emulsifier, and water
See 0361

DIFFUSERS
Swirl Diffuser: A gas diffuser, based on swirling flow, dissipates the incoming gas velocity in a relatively short distance
See 0993

DIFFUSION
Low-Temperature Water Diffusion in SiO2 Thin Films: Nuclear-resonance profiling looks into the formation mechanism of IC thin films
See 0109
Measuring Diffusion and Recombination in Polycrystalline Silicon: Light-beam-induced currents yield information about solar-cell material
See 0354

DIFFUSION COEFFICIENTS
Diffusion Measurements in Microemulsions: Polarography yields the same value of diffusion coefficients as quasi-elastic light scattering (QLS)
See 0096

DIGITAL FILTERS
Digital Filters for Two-Dimensional Data: Computationally efficient filters speed the processing of two-dimensional experimental data
See 0199

DIMENSIONAL MEASUREMENT
Improved Coal-Thickness Measurement: Summed signals and a dielectric-filled antenna improve the measurement
See 0915
Measuring Coating Thickness: A gage measures the coating thickness in holes
See 0515
Thickness Gaging of Vapor-Deposited Metal Films: Phase-sensitive eddy-current instrument and microprocessor determine thicknesses with (25-nm) precision
See 0575

DIRECTIONAL COUPLERS
Directional Coupler With Increased Directivity: Diffraction loss is reduced by curving one reflector
See 0235

DIRECTORIES
Biotechnology Resources Directory Revised
See 0847

DISASTERS
LANDSAT Emergency Access and Products (LEAP)
See 0148

DISCONNECT FITTINGS
Reusable High-Pressure Connector: Connector for tests at 9,000 psi requires only minimal modification to the free end of the fluid line
See 0704

DISEASES
Method of Continuous Production of Retroviruses (HTL V-III) from Patients with AIDS and pre-AIDS
See 0868
New Tests for Gaucher's Disease Predict Nervous System Involvement
See 0875
NICHD-Supported Scientists Design Test for Prenatal Diagnosis of PKU
See 0877
Serological Detection of Antibodies to HTLV-III in Sera of Patients with AIDS and pre-AIDS Conditions
See 0885

DISPENSERS
Dispensing Small Measured Volumes of Liquid: Unit measures, filters, and unloads oil into a container
See 1009

DISPERSION HARDENING
Improving Oxide-Dispersion-Strengthened Alloys: Study examines ways to improve high-temperature performance and production techniques of NiCrAlY alloys
See 0789

DISPLAY DEVICES
Binocular Overlap in a Fiber-Optic Helmet-Mounted Display Has Been Completed
See 0041
Microcomputer Multiplexes Alphanumeric Labels on CRT's: External, low-power alphanumeric label generator eliminates costly video circuitry
See 0269

DISTANCE MEASURING EQUIPMENT
Measuring Recessed Pins: A sleeve-and-rod-tool measures distances in blind locations
See 0519

DISTILLATION
Analytical Methods for Synfuel Production: Techniques sometimes produce differing results from laboratory-to-laboratory
See 0087
High-Yield Alcohol Fermentation Process: Vacuum fermentation combined with vacuum distillation reduces energy needs
See 0102
Low-Pressure Alcohol Distillation: Heat requirements are lowered for the process
See 0107

DISTRIBUTED PROCESSING
Distributed Data Processing in Manufacturing: Departmental minicomputers connected to a large host computer can increase productivity
See 0620

DIVERS
Seawater Hydraulic Motor Under Development
See 0708

DIVERSITY RECEPTION
Receiver for Antenna Arrays: A scheme to obtain an amplified, demodulated output
See 0188

DOLLIES
Transporter for Treated Sheet Materials: Plastic spacers keep parts separated during transport or storage
See 1020

DOORS
Flexible Vinyl Strip Doors Decrease Heat Loss
See 0074
Retractable Rotating Door Latch: After release, the latch withdraws out of sight
See 0703

DOPPLER EFFECT
Measuring Slurry Flow: Noncontact ultrasonic instrument is accurate and versatile
See 0520

DOSIMETERS
Optical-Fiber Dosimeter: Portion of red-to-blue light spectrum transmitted indicates radiation dose
See 0543
Tiny Radiation Warning Devices: Miniature radiation warning device that enhances nuclear industry worker safety
See 0438

DOSIMETRY
Liquid Pathway Dose Calculations (LADTAP2)
See 0866
Multiple-Compartment Dosimeter: Radiation dose is measured at various depths
See 0869

SUBJECT INDEX

Wristwatch Dosimeter: Besides telling the time, a device indicates radiation dosage and dosage rate
See 0587

DOVETAILS

Machining Dovetails Efficiently: A cross-axial milling technique is fast and precise
See 0670

DRAG CUTTERS

Instrumented Pick Detects Coal/Rock Interface: Strain-gage signals indicate whether coal or rock is being cut
See 0918

DRAG REDUCING AGENTS

Compliant Coatings for Turbulent Drag Reduction Under Development
See 0939

DRAINAGE WELLS

Design, Construction and Development of In Situ Mining Wells
See 0902

DREDGE SPOIL

Model Developed To Simulate Dredged Material Movement
See 0412

DRILL BITS

Mechanical Coal-Face Fracturer: Radial points on a proposed drill bit would take advantage of the natural fracture planes of the coal
See 0919

Reducing Drill Bit Wear Through Electrochemistry: A small source of electrical power downhole makes bits last longer
See 0694

DRILL PIPE

Drill-Pipe Severing Tool for Geothermal Wells: Explosive device is compatible with high borehole temperatures
See 0905

DRILLING

Drilling Precise Orifices and Slots: A combination of mechanical drilling and EDM is used
See 0621

Flexible Roof Drill for Low Coal: A rod-changer drill system increases drill-bit life by 300 percent
See 0909

Hole-Center Locating Tool: Tool alines the center of a new hole with that of an existing hole
See 0650

DRILLING MACHINES(TOOLS)

Quieted Hand-Held Percussion Drills
See 0927

DRIVES

Coaxial Redundant Drives: Harmonic drives allow redundancy and high output torque in a small package
See 0605

DROP FURNACES

Imaging Bubble Formation In a Drop Tube: The entire process is under control of a computer
See 0951

DROPS(LIQUIDS)

Fabrication of Hollow Spheres: A nozzle forms gas-filled spherical shells of high dimensional uniformity
See 0935

Flow of Non-Newtonian Liquids After Impact: Nonideal viscoelastic properties speed up spreading of drops on surfaces
See 0965

Imaging Bubble Formation In a Drop Tube: The entire process is under control of a computer
See 0951

DRUG THERAPY

Bone Damage Linked To Long-Term Steroid Therapy
See 0848

New System For Administering Chemotherapy Is Developed
See 0874

DRUGS

Drug for Skin Diseases is Successful for Treating Arthritis
See 0855

Prodrugs Based on Phospholipid-Nucleoside Conjugates: New substances last longer in the body and are more effective
See 0882

Researchers Produce a Tumor Localizing Agent
See 0884

DRYERS

Drying Wood With the Sun: Booklet shows how to build a solar-heated firewood dryer
See 0770

DUST

Longwall Coal Mine Respirable Dust Sources
See 0407

DUST COLLECTORS

Better Roof Bolter Dust Collector Maintenance Reduces Silica Dust Levels
See 0896

DUST CONTROL

Better Roof Bolter Dust Collector Maintenance Reduces Silica Dust Levels
See 0896

Blowing Dust Away With Electrostatic Wind: Ionized air molecules drive away contaminants
See 0226

Headgate to Tailgate Cutting Lowers Longwall Shearer Operators' Dust Exposure
See 0912

How to Reduce Shearer Operators' Dust Exposure By Using Remote Control
See 0913

Reducing Longwall Face Workers' Respirable Dust Exposure From Roof Support Movement
See 0928

DUST EXPLOSIONS

Characterization of Explosive Dusts: The hazards of several explosive dusts are established
See 0161

DYE LASERS

Highly Stable Lasers for Precision Tests Developed
See 0492

Improved Cooling System for Organic Dye Lasers: Complexity and expense are substantially reduced
See 0972

DYNAMIC STRUCTURAL ANALYSIS

Estimating Design Loads in Coupled Vibrating Structures: Approximate spectral analysis is faster and less expensive than transient analysis
See 1001

DYNAMOMETERS

Test-Bench Dynamometer: It would simulate programs for electric/hybrid vehicle design
See 0571

EAR

Cochlear Implants May Allow Some Deaf People To Hear
See 0042

EARTH DAMS

Spill Alert Device for Earth Dam Failure Warning
See 0156

EARTH FILLS

Assessing Landfill Gas Recovery Projects: Factors are provided for determining technical and economic feasibility of existing landfills
See 0303

Assessment of Landfill Methane Recovery: An assessment of the pros and cons and an annotated bibliography provide information on this untapped energy source
See 0386

Landfill Gas Recovery: Existing and proposed methodologies for the recovery of methane from landfills are surveyed
See 0406

Modeling Landfill Methane Recovery: Two- and three-dimensional computer simulations are used for the analysis of gas recovery in landfills
See 0413

Standardized Procedures for Planting Vegetation on Completed Sanitary Landfills
See 0433

Waste Disposal at Synthetic-Fuel Plants: Disposal is examined from engineering, environmental, and economic viewpoints
See 0442

ECONOMIC MODELS

Economic Model Assesses Benefits of Improved Test Accuracy
See 0623

EDDY CURRENT TESTS

Eddy-Current Damage Test for Carbon Composites: A nondestructive test method detects cracks in materials of low conductivity
See 0475

EDUCTORS

Jet Engines as High-Capacity Vacuum Pumps: A large diffuser operational envelope and long run times are possible
See 0165

ELASTOMERS

Calculating Static-Seal Leakage Correlation: Operational leakage rates of various working fluids are predicted from test data
See 0750

Characterization of Elastomer Vulcanizate Materials: Pyrolytic gas liquid-phase chromatography (PGC) identifies elastomers in sealing and connecting components of hydraulic system
See 0752

Estimating the Degree of Cross-Linking in Rubber: A new analysis of both the extension and retraction may give better estimates
See 0775

Making Thermoplastics Flame-Resistant: Elastomer-coated hydrate salts are added
See 0796

Nonpetroleum Substitutes for Rubber: Several blends of reinforcement fillers are evaluated
See 0807

Perfluoroalkylene-Ether Triazine Elastomers: New process yields a product that resists heat and the action of oxygen and water
See 0123

Radiation Improves Materials Bonding: Bonds with fluorocarbons are made without surface preparation
See 0818

ELECTRIC BATTERIES

Battery Grid for Submarines May Have Industrial Uses
See 0748

Catalysts for Lithium/Thionyl Chloride Cells: Organic compounds of iron or cobalt improve voltage and capacity of electrochemical cells
See 0090

Cathode Corrosion in Lithium/ulfuryl Chloride Batteries: Causes and cures of short shelf life are examined
See 0308

Costs of Batteries for Photovoltaic Power Systems: Installed and life-cycle costs for several technologies and applications are evaluated
See 0315

Estimating the Solubility of Gases in Battery Electrolytes: The estimates are in excellent agreement with experimental values
See 0326

Evaluating Lithium Sulfuryl Chloride Batteries: With development and selection of suitable materials, practical high-energy-density batteries can be built
See 0327

Improved Negative Electrodes for Secondary Cells: Additives significantly improve cell capacity and stability over multiple discharges
See 0342

Interelectrode Separator for Lithium Cells: Enhanced wettability is obtained
See 0346

Lithium/ulfuryl Chloride Battery: Safety and long shelf life are sought
See 0349

Lithium/Vanadium Oxide Storage Cells: Year-long study reveals high charge retention
See 0350

Manometer Measures Gas Flow: Apparatus uses water displacement to measure gas flow at low rates
See 0513

Measuring Power Flow in Electric Vehicles: Instrument accommodates switching transients and common-mode voltages
See 1015

Power System for Electrical Vehicles is Being Developed
See 1018

Primary Lithium/Organic Electrolyte Battery: Nonhazardous, high-temperature operation is obtained
See 0360

Rechargeable Secondary Lithium Battery: Flat-plate 10- and 20-Ah batteries are demonstrated
See 0362

Ternary Compound Electrodes for Molten-Salt Cells: Corrosion is reduced, and fabrication is simplified
See 0371

ELECTRIC COILS

Improved Coil for Hydrogen Dissociators: The flat coil has a rigid printed-circuit substrate
See 0971

ELECTRIC CONNECTORS

Conical Electrical Connectors Aline Easily: Rotational alinement is not critical in a design useful for remote manipulators
See 0231

Latching Mechanism for Umbilical Connectors: Connectors for power, data, and coolant are automatically mated
See 0664

Reducing the Resistance of Conductive-Adhesive Bonds: Current pulses lower the resistance of silver-filled epoxies
See 0286

ELECTRIC CONTACTS

Electrolytic Sharpening of Diode-Contact Whiskers: Phosphor bronze wire is pointed without highly-toxic chemical reagents
See 0239

Ti/Pd/Cu Contacts for Semiconductor Devices: Copper systems are equivalent in performance to silver or gold systems
See 0298

ELECTRIC COUNTERSHOCK

Researchers Test Device to Aid Cardiac Patients
See 0063

ELECTRIC DEVICES

Blowing Dust Away With Electrostatic Wind: Ionized air molecules drive away contaminants
See 0226

Electronic Parts for Geothermal-Well Logging: Performance and endurance are examined at high temperature
See 0906

Modernized Electronic Manufacturing Facility: Fabrication and testing capabilities are described
See 0272

Polymeric Applications in Electronics: A training manual shows how to use polymeric materials in fabricating electronic components
See 0809

ELECTRIC FIELDS

Blowing Dust Away With Electrostatic Wind: Ionized air molecules drive away contaminants
See 0226

Primer is Developed for Measuring 60-Hz Fields
See 0550

ELECTRIC FILTERS

Band-Pass Amplifier Without Discrete Reactance Elements: Inherent or 'natural' device capacitance is exploited
See 0225

ELECTRIC INSULATORS

Power Frequency Strengths of Insulation Structures: Study examines recent developments in insulation against power-frequency overvoltage
See 0279

ELECTRIC MOTORS

Electric Motors and Energy Consumptions: Cost of energy-efficient motors found to be greater than the savings that would result from their operation
See 0238

High Efficiency Motors Pay Off
See 0250

Phase Detector for Power-Factor Controller: Positive feedback assures reliable switching
See 0276

Power-Factor Controller With Fast Load Response: Sudden changes in induced emf are sensed
See 0280

ELECTRIC POWER GENERATION

Value of Wind and Solar Thermal Energy: Computer programs allow utilities to determine overall electric-energy production costs
See 0375

ELECTRIC POWER TRANSMISSION

Superefficient VAR Controller: A superconducting coil controls reactive power with minimal loss
See 0370

ELECTRIC SWITCHES

DC Switching System Rapidly Limits and Interrupts Fault Currents
See 0901

High-Power Switching Transistor: Improved switching transistors handle 400-A peak currents and up to 1,200 V
See 0253

High-Voltage Spark-Gap Switch: Overvoltage device operates safely and reliably with high precision
See 0256

Solid-State Crossbar Switch: It combines analog and digital circuits for multiline/multiport switching
See 0290

ELECTRIC UTILITIES

Integrating Wind Turbines Into a Conventional Utility
See 0345

ELECTRIC VEHICLES

Measuring Power Flow in Electric Vehicles: Instrument accommodates switching transients and common-mode voltages
See 1015

Power System for Electrical Vehicles is Being Developed
See 1018

ELECTRIC WIRE

Add-On Shielding for Unshielded Wire: Prefabricated harness shields wires already soldered to connectors
See 0224

Stripper for Cables of Any Cross Section: Shoulders prevent penetration any deeper than intended
See 0294

Superconducting Wire With Improved Strain Tolerance: Winding stresses have a less adverse effect on current-carrying capacity
See 0992

Wire Tester: Detects breaks, changes in cross section, and embedded foreign material
See 0586

ELECTRICAL CONDUCTIVITY

Mixed Conduction in Semi-Insulating Gallium Arsenide: A new analytic technique allows more accurate calculations
See 0530

ELECTRICAL INSULATORS

Suppression of Dielectric Breakdown of Insulators at High Temperatures
See 0296

ELECTRICAL MEASUREMENT

Computer Energy Time Unit Devised
See 0459

Electricity Calibration Service For Wattmeters and Watthour Meters
See 0477

Predicting Sintered-Metal Resistivity From Porosity: An equation with one adjustable parameter fits the experimental data for nickel
See 0810

Primer is Developed for Measuring 60-Hz Fields
See 0550

ELECTROCARDIOGRAPHY

Microcomputer Multiplexes Alphanumeric Labels on CRT's: External, low-power alphanumeric label generator eliminates costly video circuitry
See 0055

ELECTROCHEMICAL MACHINING

Electrochemical Deburring: Machining burrs are removed from inaccessible areas
See 0626

Electrochemical Deburring: The technical and economic capabilities of the process are characterized
See 0627

Electrolytic Sharpening of Diode-Contact Whiskers: Phosphor bronze wire is pointed without highly-toxic chemical reagents
See 0239

ELECTROCHEMISTRY

Catalysts for Lithium/Thionyl Chloride Cells: Organic compounds of iron or cobalt improve voltage and capacity of electrochemical cells
See 0090

Multifunctional Sensor Electrode
See 0532

Photoacoustic Spectroscopy of Chemical Reactions: Technique yields information on polymerization and electrochemical reactions
See 0125

Rechargeable Secondary Lithium Battery: Flat-plate 10- and 20-Ah batteries are demonstrated
See 0362

ELECTRODEPOSITION

Electrodeposition Repair of Damaged Metal Parts: Damaged material is replaced by electrodeposited copper
See 0628

Electroplating Small Particles: Particles are kept in motion near the cathode while they are plated
See 0629

Plating Process to Improve Use of Chromium Has Been Developed
See 0683

Pulsed Electrodeposition of Alloys: Chemical composition versus thickness profile of plated alloys improved using pulsed plating
See 0817

Reproducible Mirror-Finish Metal Surfaces: Method produces highly reflective metal surfaces
See 0985

ELECTRODES

Improved Negative Electrodes for Secondary Cells: Additives significantly improve cell capacity and stability over multiple discharges
See 0342

Improved Nickel-Cell Electrode Material: An ozonation process gives higher capacity
See 0343

Multifunctional Sensor Electrode
See 0532

Ternary Compound Electrodes for Molten-Salt Cells: Corrosion is reduced, and fabrication is simplified
See 0371

Vibrating Electrode System Improves Trace Element Detection
See 0140

ELECTROLESS PLATING
Plated Metal Powders for Electrode Pastes: Metal grains to be sintered are precoated with frit metal
See 0682

ELECTROLYSIS
Improved Gas Seal for Electrolytic Cells: Breakage by differential thermal expansion is reduced
See 0103

ELECTROLYTES
Estimating the Solubility of Gases in Battery Electrolytes: The estimates are in excellent agreement with experimental values
See 0326
Evaluating Lithium Sulfuryl Chloride Batteries: With development and selection of suitable materials, practical high-energy-density batteries can be built
See 0327
Primary Lithium/Organic Electrolyte Battery: Nonhazardous, high-temperature operation is obtained
See 0360
Rechargeable Secondary Lithium Battery: Flat-plate 10- and 20-Ah batteries are demonstrated
See 0362

ELECTROMAGNETIC INTERFERENCE
Design Considerations of Reverberating Chamber
See 0461
Evaluation of the Comprehension of Non-Continuous, Sped-Up Vocoded Speech: A strategy for coping with fading HF (high frequency) channels
See 0180

ELECTROMAGNETIC NOISE
Scientists Develop New Millimeter Wave Noise Standard
See 0559

ELECTROMAGNETIC SHIELDING
Add-On Shielding for Unshielded Wire: Prefabricated harness shields wires already soldered to connectors
See 0224
Improved Connector Shell for Cable Shields: Braid is gripped around its entire circumference
See 0257
Shielded Aluminum Flat-Conductor Cable: Thin wiring harness stores compactly
See 0288
Shielding Effectiveness Measuring Techniques Are Investigated
See 0826

ELECTROMETERS
Charged-Particle Flux Sensor: Improved design has greater collection efficiency
See 0456

ELECTROMYOGRAPHY
Computer Program Uses Fundamental Neuroanatomy as the Basis for Interpreting Patient Data
See 0850

ELECTRON BEAMS
Electron Beam Could Probe Recombination Centers: Properties of multilevel deep traps could be investigated
See 0478

ELECTRON DENSITY
Charged-Particle Flux Sensor: Improved design has greater collection efficiency
See 0456

ELECTRON GUNS
An Electron Beam-Bunching Gun for RF Tubes: New electron-beam source provides for a new class of millimeter wave tubes
See 0240

ELECTRON MICROSCOPY
Microscopy Opens New Frontier at Berkeley: Two electron microscopes reach unprecedented performance heights, one revealing atoms directly
See 0529

ELECTROPLATING
Activated Carbon Process for the Treatment of Cadmium(II)-Containing Wastewaters
See 0378
Nonliquid Process Prepares Plastics for Electroplating: Gaseous-phase preparation is much simpler than conventional liquid-phase preparation
See 0806

ELECTROSTATIC LENSES
Improved Electrostatic Optical System: The device is suitable for molecular epitaxial formation of semiconductor components
See 0653

ELECTROSTATIC PRECIPITATORS
Computer Model Developed to Help Predict Solutions to Electrostatic Precipitators Problems
See 0390
Mathematical Model of Electrostatic Precipitation for the Texas Instruments Programmable 59 Calculator
See 0410

EMBRITTLEMENT
Anisotropic Embrittlement in Hard ESR Steel Forgings: The short transverse direction loses ductility
See 0747
Crack Initiation and Propagation in Alloys: Study characterizes mercury-embrittled aluminum, steel alloys, and brass
See 0762
Hydrogen Embrittlement in ESR 4340 Steel: The type of remelt process correlates with susceptibility
See 0787

EMBRYOS
Computer Simulates Organogenesis
See 0851

EMERGENCIES
LANDSAT Emergency Access and Products (LEAP)
See 0148

EMULSIONS
Diffusion Measurements in Microemulsions: Polarography yields the same value of diffusion coefficients as quasi-elastic light scattering (QLS)
See 0096

ENCAPSULATION
Preventing Moisture Damage To Solar Panels: A proposed encapsulant would dissociate water into gas
See 0359
Removable Foam Encapsulants: Thermoplastic potting compound can be dissolved when necessary
See 0819

ENERGY ABSORPTION
Energy Absorption in Composite Materials: Crash-resistance potential is found in these materials
See 0772
Increasing Fluid Compressibility With Plastic Spheres: Suitability of various sphere materials is evaluated
See 0790

ENERGY ANALYSES
Environmental Data on Energy Technologies: Handbook shows environmental data for major energy technologies
See 0397

ENERGY ANALYSIS
Energy and Air Quality: Handbook aids in planning the growth of energy facilities
See 0394
Energy Technologies and the Environment: A Handbook: The effects of key technologies over the next 20 years are examined
See 0396
Reducing Energy Costs in Frozen-Food Processing: A handbook describes methods to reduce the energy costs
See 0363

ENERGY CONSERVATION
Algorithm Developed For Best HVAC Start/top Times
See 0069
The Benefits of Thermal-Energy Storage: Residential sector using this technology may save an estimated 80 million barrels (12.7 x 10(6) m(3)) of oil annually by the year 2000
See 0304
Conserving Energy in Scrap Iron and Steel Facilities: Energy costs can be reduced by 20 or more percent
See 0756
Conserving Energy in the Iron and Steel Industry: An analysis of energy and materials flows shows opportunities and obstacles to energy conservation
See 0314
Daylighting Can Cut Energy Use
See 0073
Energy Conservation in the Meat Industry: Ten case histories
See 0323
Energy Conservation in the Textile Industry: Case histories show how energy costs can be reduced and fossil fuels conserved
See 0324
Energy Integrated Farm System: Mathis Farm and Georgia Institute of Technology
See 0023
Instrumentation for an Energy-Conserving House: Sensors, data logging, and data processing are described
See 0075
Insulation Cuts Steam Use: Payback for insulating nitrocellular boiling tubs is less than four years
See 0344
Insulation Deficiencies And Their Effects On Heat Loss In Housing
See 0076
Lighting-Control Strategies That Save Energy: Two automatic-control schemes offer substantial energy savings for commercial buildings
See 0348
National Appropriate Technology Assistance Service Established: The service provides engineering, scientific and commercialization technical assistance for energy-related technologies
See 0357
Reducing Energy Costs in Frozen-Food Processing: A handbook describes methods to reduce the energy costs
See 0363
Solid-State Ballasts for Fluorescent Lamps: Major savings in lighting energy can be realized
See 0289
Turning Wastes Into Resources: Report describes innovative improvements in sewage management
See 0441

ENERGY CONSUMPTION
Computer Energy Time Unit Devised
See 0459
Electric Motors and Energy Consumptions: Cost of energy-efficient motors found to be greater than the savings that would result from their operation
See 0238
Energy Integrated Farm System: Mathis Farm and Georgia Institute of Technology
See 0023
Figuring Residential Energy With Pocket Calculator: Consumption for heating and cooling can be calculated quickly and easily
See 0329
Reducing Energy Costs in the Plastics Industry: A variety of simple, fast-payback methods are suggested
See 0364

ENERGY MODELS
Memory-Efficient Energy Network Has Been Developed
See 0355

ENERGY SOURCE DEVELOPMENT
Energy and Water Resources: Data on uses, problems, and regulations are presented
See 0907

ENERGY STORAGE

Aquifer Thermal-Energy Storage: A guide tells how to design and evaluate aquifer thermal-energy storage systems
See 0893

Sampling Aquifer Thermal-Energy Storage Systems: Guidelines are offered for gathering, storing, and analyzing water specimens
See 0366

Two-Fluid Solar Pond: Proposed insulated covered cavity would absorb and store solar energy in its lower heavier layer
See 0373

ENHANCED RECOVERY

Microbial Enhancement of Oil Recovery: Bacteria aid in oil production and utilization
See 0921

Oil Recovery Enhancement With Paper Pulp Wastes
See 0420

ENTHALPY

Enthalpy of Coal Fluids: Thermodynamic model aids in simulation of synthetic fuel processes
See 0098

ENVIRONMENTAL ENGINEERING

Guide to Calibrating Temperature Devices is Available
See 0490

Instrumentation for an Energy-Conserving House: Sensors, data logging, and data processing are described
See 0075

ENVIRONMENTAL IMPACTS

Assessment of Landfill Methane Recovery: An assessment of the pros and cons and an annotated bibliography provide information on this untapped energy source
See 0386

ENVIRONMENTAL SURVEYS

Air Land Water Analysis System (ALWAS): A Multi-Media Model for Toxic Substances
See 0379

Energy Technologies and the Environment: A Handbook: The effects of key technologies over the next 20 years are examined
See 0396

Environment and Small-Scale Hydroelectric Development
See 0325

Environmental Data on Energy Technologies: Handbook shows environmental data for major energy technologies
See 0397

Environmental Hazards of TNT: Reactions between TNT and soil components are discussed
See 0398

Multifunctional Sensor Electrode
See 0532

Resonance Ionization Mass Spectrometry
See 0131

Standards For Toxic Metals In Human Urine Are Developed
See 0133

EPITAXY

Gallium Arsenide Waveguide for Light: Molecular-beam epitaxy creates a structure having controllable properties
See 0970

EPOXY MATRIX COMPOSITES

Characterizing Epoxy Matrices for Composites: A variety of testing techniques used in combination yield information useful for quality control
See 0754

Determining the Orientation of Anisotropic Materials: Ultrasonics probe the direction of tile fibers
See 0466

Fabrication of Graphite/Epoxy Column Elements: Dimensionally precise columns are wound on vertical mandrels
See 0776

Properties of Wet Kevlar/Epoxy Composites: Wet and dry materials are compared and reasons for differences are explored
See 0816

EPOXY RESINS

Accelerated Curing of Epoxy Resins: Trisubstituted urea/epoxy mixture generates amine that lowers the curing temperature
See 0084

Accelerating Epoxy-Resin Curing: Trisubstituted ureas simplify the curing process and speed it up
See 0085

Characterizing Epoxy Matrices for Composites: A variety of testing techniques used in combination yield information useful for quality control
See 0754

Epoxy Grout With Silica Thickener: Grout cures quickly, even in the presence of hydraulic oil
See 0773

Measuring Epoxy-Curing Kinetics: Key reaction parameters are estimated from a single run
See 0110

Neutron Scattering Is Used To Study Structures In Epoxies
See 0116

Standards for Epoxies Used in Microelectronics: Report has significant commercial applications
See 0832

Ultrasonic Blending of Epoxy Curing Agents: Method is fast, safe, and proven effective
See 0139

EROSION

Erosion-Resistant Composite Material and Method For Preparation
See 0774

ETCHING

Improved Electrostatic Optical System: The device is suitable for molecular epitaxial formation of semiconductor components
See 0653

Manufacturing Surface-Acoustic-Wave Devices: Work on an early phase of manufacturing development is described
See 0268

ETHER/DIGLYCIDYL

Fire-Resistant Composites: A resin blend produces high-char-yield, low-smoke composites
See 0780

ETHYL ALCOHOL

Alcohol/Petroleum Fuels for Diesel Engines: Blends of methanol, ethanol, water, and diesel fuels were formulated and evaluated
See 0300

High-Yield Alcohol Fermentation Process: Vacuum fermentation combined with vacuum distillation reduces energy needs
See 0102

Retrofitting Diesels to Burn Alcohol: The problems and future potential of using ethanol as a fuel in diesel engines are discussed
See 0173

EUTECTIC ALLOYS

Directional Solidification of Monotectic Alloys: Cooling at certain rates produces fibrous composite structures
See 0768

EVAPORATORS

Evaporation Tower With Prill Nozzles: A tower could be more efficient than conventional evaporation equipment
See 0024

EXCAVATING EQUIPMENT

Robotic Control System for Excavation Equipment: Full automation offers great flexibility
See 0154

EXHAUST EMISSIONS

How Synfuels Behave in Gas Turbines: Combustion products can be different from those of petroleum-based fuels
See 0338

A Multifuel, Low-Emission Gas Turbine: Variable-area air injector improves efficiency at all power levels
See 0416

Reducing Soot in Diesel Exhaust: Electrically charged fuel improves oxidation
See 0426

EXHAUST GASES

Diesel Particulate Destruction: A pulsed electrical discharge eliminates particulates in diesel exhaust
See 0392

EXOBIOLOGY

Bacteria Count Photometer is Developed
See 0999

EXPLOSION EFFECTS

Predicting Rubble Motion in Blasts: Computer model makes it possible not only to blast rock but also to move the broken rubble in a predictable manner
See 0925

EXPLOSIONS

Cannon Reduces Municipal Solid Wastes: A pressure vessel uses explosive decompression to shred solid wastes into small particles
See 0388

Characterization of Explosive Dusts: The hazards of several explosive dusts are established
See 0161

EXPLOSIVE CUTTING

Drill-Pipe Severing Tool for Geothermal Wells: Explosive device is compatible with high borehole temperatures
See 0905

EXPLOSIVES

Controlling Explosives With Microbes: A micro-organism removes nitrate ester groups from grains
See 0852

EXTRACTION

Dual-Function Treatment for Nuclear Waste: Process prepares spent radioactive fuel for storage and extracts noble metals from it
See 0934

Extracting Oil From Tar Sands: Oil can be extracted using solar energy
See 0328

Optimization of Liquid-Liquid Extraction Methods for Analysis of Organics in Water
See 0121

Removing PCB's From Oils: Contaminated oil can be cleansed and recycled, and the PCB's disposed of in the prescribed manner
See 0428

EXTRACTORS

Staked-Bearing Removal Tool: A portable air-powered tool enables rapid bearing replacement with minimum effort
See 0720

EYE INJURIES

Investigators Work to Reduce Effects of Traumatic Eye Injuries
See 0864

EYE(ANATOMY)

Computer Analysis of Eye Blood-Vessel Images: Technique rapidly diagnoses diabetes mellitus
See 0043

FABRICATION

Fabricating Slotted-Waveguide Arrays From Sheet Metal: Low-cost lightweight waveguides are formed from rolls of aluminum
See 0246

Fabrication of Structural Cellular Glass: A surface layer is quickly heated and compressed
See 0777

FAILURE

Detecting Solar-Cell Failures: Circuit identifies a malfunctioning photovoltaic array
See 0317

Detecting Solar-Cell Failures: Circuit identifies a malfunctioning photovoltaic array
See 0463

Fatigue Strength of Pressurized Cylinders: Prestressing is found to improve fatigue resistance
See 0636

Poisoning of Semiconductors
See 0544

FARM CROPS

Jamming Courtship Signals with Scent Molecules May Curb Insect Pest
See 0026

FARMS

Energy Integrated Farm System: Mathis Farm and Georgia Institute of Technology
See 0023

FASTENERS

Improved Connector Shell for Cable Shields: Braid is gripped around its entire circumference
See 0257

Lock for Tube Fittings: Covers for the fitting nuts engage to secure the fittings
See 0665

Retaining Ring Fastener for Solar Panels: A collapsible linkage enables rapid installation and removal of panels
See 0701

Self-Locating Latch: A latch locates fittings without using electronic sensors
See 0710

Self-Locking Connector: Mechanism is spring-loaded into a normally locked position
See 0711

FATIGUE TESTS

Ultrasonic Detection of Fatigue Cracks: Report notes progress in ultrasonic characterization of crack growth
See 0579

FATIGUE(MATERIALS)

Cumulative Fatigue Damage in Composites: The extent of damage is correlated with remaining life expectancy
See 0765

Fatigue Life of Notched-Steel Specimens: Fatigue crack growth results are presented for a series of bending tests of high-strength, notched-steel specimens
See 0778

Fatigue Strength of Pressurized Cylinders: Prestressing is found to improve fatigue resistance
See 0636

FEDERAL TECHNOLOGY RESOURCE

Animal Tissue Specimens Available
See 0843

Biotechnology Resources Directory Revised
See 0847

Clinical Mass Spectrometers Are Now Available
See 0458

FDA Testing Of Medical Devices
See 0048

Food Irradiation Expertise is Developed
See 0859

Hybridoma Data Bank Available
See 0863

Microscopy Opens New Frontier at Berkeley: Two electron microscopes reach unprecedented performance heights, one revealing atoms directly
See 0529

Modernized Electronic Manufacturing Facility: Fabrication and testing capabilities are described
See 0272

National Appropriate Technology Assistance Service Established: The service provides engineering, scientific and commercialization technical assistance for energy-related technologies
See 0357

National Laser Users Facility: Experiments in High Energy-Density Physics
See 0938

National Tritium Labeling Facility
See 0870

New Standard Antibody Sera Are Now Available From CDC
See 0873

Occupational Health Information System Developed
See 0878

The Ocean Pollution Data and Information Network (OPDIN)
See 0944

Parasite Specimens Available
See 0880

Serum or Plasma Specimens from Transfusion-Transmitted Viruses Study are Available
See 0064

Special Primate Specimens Are Now Available
See 0888

Tissue Specimens Available for Pathology Studies
See 0891

FEEDBACK CONTROL

Electrostatic Levitator With Feedback Control: Sample position is automatically maintained
See 0630

Harmonic-Balance Algorithm for Nonlinear Systems: Limit cycles are identified in systems with multiple nonlinearities and multiple paths
See 0204

FEEDING STUFFS

Making Food From Sawdust
See 0027

FERMENTATION

High-Yield Alcohol Fermentation Process: Vacuum fermentation combined with vacuum distillation reduces energy needs
See 0102

Removing Biostatic Agents From Fermentation Solutions: Liquid carbon dioxide is an inexpensive solvent
See 0883

FERROELECTRICITY

Glass Ceramics, Shape Memory, and Ferroelectric Materials: Report presents three results from materials studies
See 0784

FERTILIZERS

Making Food From Sawdust
See 0027

FIBER COMPOSITES

Determining the Orientation of Anisotropic Materials: Ultrasonics probe the direction of tile fibers
See 0466

Low-Weight Inserts for Aluminum Honeycomb Panels: Fiber/epoxy composites would be used in place of solid aluminum
See 0795

Metal Coating Multifilamentary Yarns: Process provides uniformly coated fibers for reinforcing high-temperature composites
See 0802

Stronger Carbon Fibers for Reinforced Plastics: New process makes fibers 70 percent stronger at lower carbonization temperatures
See 0835

Tensile Strengths of Alumina Fiber Composites: High correlation between experimental and theoretical results is obtained
See 0837

FIBER METALLURGY

Directional Solidification of Monotectic Alloys: Cooling at certain rates produces fibrous composite structures
See 0768

FIBER OPTICS

Angular Measurements in Gimbal-Mounted Sensors: Fiberoptic lightguide pickoff has good signal resolution and accuracy without disadvantages of mechanical inertial-guidance systems
See 0450

Bidirectional Fiber-Optic Cable Adapter: Two different wavelengths of light are transmitted in opposite directions on a single optical fiber
See 0956

Binocular Overlap in a Fiber-Optic Helmet-Mounted Display Has Been Completed
See 0041

Effect of Temperature on Fiber-Optic Delay: Fiber/jacket interactions affect performance
See 0963

Fabricating Grating Couplers on Optical Fibers: Microscopic corrugations are formed on fiber surfaces
See 0964

Fiber-Optic Communications Cable: Ruggedized cable design meets tough optical, environmental, and mechanical standards
See 0247

Fiber-Optic Instrumentation Link: Data transmission is immune to interference
See 0181

Field Repairs of Optical-Fiber Communication Links: Fixture allows splicing with minimal skill
See 0182

New Method of Joining Optical Fibers Is Developed
See 0978

Novel Fiberoptic Gyroscope Demonstrated
See 0541

Polymer Bonding of Optical Fibers: Optical waveguides are coupled through their sides
See 0982

Stabilizing Fiber-Optic Transmission Lines: A voltage-controlled optical phase shifter is the key
See 0292

FIBER OPTICS TRANSMISSION LINES

Optical Coupler/Decoupler Communication Module: Design uses efficient, high-resolution-wavelength multiplexer
See 0186

FIBER REINFORCED PLASTICS

Plasma Treatment of High-Strength Fibers: Continuous process yields large quantities of wettable fibers for lamination
See 0808

FIBERGLASS REINFORCED PLASTICS

Analytical Methods for Glass-Fiber-Reinforced Composites: Techniques for quality control are reviewed
See 0746

FILAMENT WOUND MATERIALS

Wet-Filament Winding Process: Composite-manufacturing method offers versatility
See 0842

FILLERS

Nonpetroleum Substitutes for Rubber: Several blends of reinforcement fillers are evaluated
See 0807

FILTERS

Digital Filter for Detecting Infectious Diseases: Low-speed, low-pass filter extracts information from noise-obscured data
See 0045

FINITE ELEMENT ANALYSIS

Vibration Analysis Reduces Computer Time: Calculation cost is reduced without loss of accuracy
See 0998

FIRE DOORS

Improved Fire Doors For Noncoal Underground Mines
See 0916

FIRE FIGHTING

Low-Temperature Plenum System Used for Firefighting Training Smoke Generators
See 0077

Study to Improve Fire Fighter Training
See 0563

Training Simulator for Fire Management: Users manipulate resources in practicing fire-control strategy
See 0082

FIRE PROTECTION

Control-Chain Safety Tray and Friction Pull: A sprinkler-system control chain is stored above a suspended ceiling
See 0611

Guidelines for Placement of Product-of-Combustion Fire Sensors in Underground Mines
See 0491

FIRE RESISTANT MATERIALS

Fire Retardants in Packaging: Wooden boxes and fiber containers for ammunition storage are treated with fire retardant to eliminate spread of fire
See 0779

Fire-Resistant Composites: A resin blend produces high-char-yield, low-smoke composites
See 0780

Quantitative Analysis of Fire-Resistant Fuel: Spectrophotometry monitors proportions of fuel, emulsifier, and water
See 0361

FIRE RESISTANT PLASTICS

Improved Thermosetting Imide Resins: The modified resins have a lower curing temperature
See 0788

Solvent-Resistant Polysulfones: Polysulfones terminated with trimethylsilylethynyl, ethynyl, and phenylethynyl groups have increased solvent resistance
See 0831

FIRE SAFETY

Computer Program Simulates Room Fires and Estimates Safet Egress Time
See 0071

FIRE TESTS

Cable Fires Studied
See 0229

FISH AGGREGATING DEVICES

Fish Aggregating Device (FAD)
See 0025

FISHES

Procedure For Benthic Resources Assessment (BRAT) Has Been Developed
See 0945

Quality Improvement of Frozen Widow Rockfish Products
See 0029

Smoked Fishery Products: Increasing Safety and Acceptability
See 0031

FISHING

Fish Aggregating Device (FAD)
See 0025

Sea Surface Temperature Maps for Fishermen
See 0030

FISHING VESSELS

A Test for the Recovery of Waste Energy in a Fishing Vessel
See 0947

FIXTURES

Bearing Measuring Fixture: Tool increases accuracy and reduces labor
See 0453

Holder for Fragile Parts: A fixture with many springfingers holds irregularly-shaped parts
See 0648

FLAME IONIZATION DETECTORS

Measuring Trace Hydrocarbons in Silanes: The technique is rapid and uses standard analytical equipment
See 0111

FLAMMABILITY

Cable Fires Studied
See 0229

FLARES

Air Pyrotechnic Signals Are Tested
See 0449

FLEXIBLE MANUFACTURING

Buyer's and User's Guide to Flexible Manufacturing Systems: Detailed advice is offered on acquiring a system, installing it, and operating it
See 0597

Flexible Manufacturing Systems: Strategies for improving productivity with computers are presented
See 0639

Requesting and Preparing Proposals: Samples provide guidance on form and content
See 0700

Technology for Flexible Manufacturing: Key subsystems are described
See 0724

FLOATING BODIES

Floating Breakwater Research Is Developed
See 0942

FLOODS

Flood Damage Database Updating Uses LANDSAT
See 0145

FLOW CHARTING

Automatic Flowsheet Layout: Software package provides instructions for an automatic drawing machine
See 0193

FLOW CONTROL

Eliminating Wind-Tunnel Flow Breakdown: Floor nozzle ensures more realistic airflow
See 0482

Improved Magnetostrictive Materials Developed
See 0495

Pressurized Slurry-Feed System: System avoids pumpage dilution and contact between pumps and abrasive liquids
See 0926

FLOW MEASUREMENT

Compressible Stability Analysis Code for Transition Prediction in Three-Dimensional Boundary Layers: Black box code for swept and tapered wings
See 0005

Directional Fluid-Flow Transducer: A probe with strain gages detects lateral fluid force
See 0473

Discriminating Between Liquid and Gas Flows: Variations in momentum density would change the position of a sensor
See 0474

Guidelines For Accurate Mine Airflow Measurements
See 0911

Magnetohydrodynamic Analogy Instrument Tests Supersonic Flows
See 0512

Manometer Measures Gas Flow: Apparatus uses water displacement to measure gas flow at low rates
See 0513

Measuring Wide-Range Gas Flow: Accurate readings are made of flows ranging over three orders of magnitude
See 0527

FLOWMETERS

Magnetic Flowmeter for Electrically Conductive Fluids: Improved accuracy is provided with minimum recalibration requirements
See 0510

Measuring Wide-Range Gas Flow: Accurate readings are made of flows ranging over three orders of magnitude
See 0527

FLUID FLOW

Computer Program for Chemically Reactive Fluid Flow: Program solves the equations of transient multicomponent chemically reactive fluid dynamics
See 0960

Directional Fluid-Flow Transducer: A probe with strain gages detects lateral fluid force
See 0473

Improved Laser Velocimeter: It can monitor fluid motion in three dimensions
See 0494

Magnetohydrodynamic Analogy Instrument Tests Supersonic Flows
See 0512

Measuring Surface-Shear Stress in a Wind Tunnel: Two-wire skin-friction gage gives both magnitude and direction of mean and fluctuating stresses
See 0523

Multivalued-Velocity-Field Model of Turbulence: The origin and propagation of vortexes are analyzed
See 0977

Shock-Free Airfoil Cascades: Fast design and analysis uses fictitious gas concept
See 0988

Stability of Tube Rows in Crossflow: Two instability mechanisms are identified in heat-exchanger tube bundles
See 0369

Staging Two-Phase Turbines: Turbine efficiency is 70 percent with staging as compared to 63 percent without staging
See 0174

Steady, Nonrotating, Blade-to-Blade Potential Transonic Cascade Flow Analysis Code: Program numerically solves an artificially time-dependent form of the actual full-potential equation
See 0991

FLUIDIC DEVICES

Purely Fluidic Servomechanisms: Fluidic integrated components are a feasible alternative
See 0691

FLUIDICS

Catalog of Laminate Layers for Fluidic Devices: Basic functions are classified and discussed
See 0600

Fluidics -- Basic Components and Applications: Report highlights the applications of fluidics for home, industry, medicine, and aerospace
See 0967

FLUIDIZED BED PROCESSORS

Combined Retort and Combustor for Oil Shale: Continuous fluidized-bed process extracts both fuel and heat
See 0312

New Insights Into Recirculating Bed Reactors: Coal mixer modeling and coal hydrodesulfurization are examined
See 0417

FLUIDS

Computer Program Available To Calculate Fluid Properties
See 0094

FLUORENE/BIS(HYDROXY PHENYL)

Fire-Resistant Composites: A resin blend produces high-char-yield, low-smoke composites
See 0780

FLUORESCENCE

Detecting Abnormal Cells by Fluorescence: Analysis by two matched stains is fast and accurate
See 0853

FLUORESCENT LAMPS

Solid-State Ballasts for Fluorescent Lamps: Major savings in lighting energy can be realized
See 0289

FLUORINE

Fluorine Mixer/Vaporizer for Chemical Lasers: The fluorine is vaporized by a flow of helium
See 0968

FLUORINE COMPOUNDS

Materials for Fluorine-Rich Environments
See 0798

FLUTTER

Two-Degree-of-Freedom Mount System for Flutter Models: Flexible rods replace conventional bearing supports to minimize structural damping
See 0577

FLYWHEELS

Containment for Flywheels: R&D is proceeding on low-cost, reliable means for containing the fragments of disintegrating automotive flywheels
See 1008

FOAM

Dielectric Scanning Locates Voids in Glass Foam: Capacitive probes may succeed where X-ray and ultrasonic equipment do not
See 0471

FOAMS

Removable Foam Encapsulants: Thermoplastic potting compound can be dissolved when necessary
See 0819

FOCAL LENGTH

Precise Measurement of Effective Focal Length: Computerized instrument measures effective focal lengths to 0.01 percent accuracy
See 0549

FOCUSING

Focusing X-Ray Monochromator for Synchrotron Radiation
See 0485

FOOD

Procedure For Benthic Resources Assessment (BRAT) Has Been Developed
See 0945

FOOD AND DRUG ADMINISTRATION

FDA Testing Of Medical Devices
See 0048

FOOD INDUSTRY

Self-Cleaning Tubular-Membrane Module: Cleaning proceeds continuously, without hindering processing
See 0825

FOOD IRRADIATION

Food Irradiation Expertise is Developed
See 0859

FOOD PROCESSING

Energy Conservation in the Meat Industry: Ten case histories
See 0323

Evaporation Tower With Prill Nozzles: A tower could be more efficient than conventional evaporation equipment
See 0024

Making Food From Sawdust
See 0027

Quality Improvement of Frozen Widow Rockfish Products
See 0029

Reducing Energy Costs in Frozen-Food Processing: A handbook describes methods to reduce the energy costs
See 0363

Smoked Fishery Products: Increasing Safety and Acceptability
See 0031

FOOT(ANATOMY)

Lightweight, Economical Device Alleviates Drop Foot: Corrective apparatus alleviates difficulties in walking for victims of drop foot
See 0054

FORESTRY

Analysis of Short-Rotation Forests: Economic strategies are evaluated
See 0892

Forest Resource Information System: Twenty-three processing functions aid in utilizing LANDSAT data for forest resource management
See 0910

Impact of Land-Based Biomass Production: Several models are evaluated
See 0914

Short-Rotation Forestry: Current state-of-the-art and future research topics are described
See 0931

FORGING

Anisotropic Embrittlement in Hard ESR Steel Forgings: The short transverse direction loses ductility
See 0747

CAD/CAM Techniques for Forging Spiral Bevel Gears: Machining time and costs are substantially reduced
See 0599

Inspecting Ingots and Preforms Prior to Hot Forging: Focused ultrasonic beams quickly and rapidly test steel ingots before rotary forging
See 0658

Mechanical Property Characterization of 4340 Steel: Forgings made from split argon/oxygen decarburized (AOD) heat of 4340 steel are compared for ballistic and mechanical properties
See 0801

Tube Recycling by Rotary Forging: Substantial cost savings are possible
See 0737

FORK TRUCKS

Evaluation of Forklift Trucks: Four different types of forklift trucks are evaluated for productivity and economy
See 1011

FORMING TECHNIQUES

Tool for Taking Clay Impressions: Profiles of parts are transferred for measurement
See 0731

FOSSIL FUELS

Advanced System for Process Engineering
See 0086

FRACTURE PROPERTIES

Determining Tensile Strength of Rocks: Simple, inexpensive method provides tensile strength of rock
See 0903

Fracture Strength of Silicon Solar Cells: Tests during processing show the way to reduce breakage and increase yield
See 0331

FRAMED STRUCTURES

Simplified Modeling of Tetrahedral Trusses: Models reduce the time and cost of structural analyses
See 0155

FREQUENCY ALLOCATIONS

Advanced Technology UHF Receiver Study: Effect on UHF television allotments
See 0176

FREQUENCY STABILITY

Highly Stable Lasers for Precision Tests Developed
See 0492

FREQUENCY STANDARDS

Efficient Distribution of Frequency-Standard Signals: Path-length-corrected system can use microwaves or optical links with minimal hardware
See 0476

New Time Dissemination Service Available
See 0539

FREQUENCY SYNTHESIZERS

Surface-Acoustic-Wave Frequency Synthesizer: Synthesizer will operate in the 1,296-to 1,533-MHz frequency range with 3-MHz step size
See 0297

FROST

Determining Frost Depth and Density: A simple device determines frost density from the volume of the melted frost
See 0464

Frost Forecasting for Fruitgrowers: Progress in forecasting from satellite data is reviewed
See 0035

FROZEN FOODS

Quality Improvement of Frozen Widow Rockfish Products
See 0029

FUEL ADDITIVES

Army Publishes Cold Weather Fuel Guide
See 0302

FUEL ALTERNATES

Renewable Energy for Industry: Guidance is given for evaluating and financing biomass, waste, solar, and wind sources
See 0365

FUEL CELLS

Calcium-Free Asbestos for Fuel Cells: An organic-acid salt removes unwanted calcium without weakening the asbestos
See 0306

Carbonate Fuel-Cell Cathode: Method for preparing porous cathode provides structural integrity and improved performance
See 0307

Fuel-Cell Reactant-Gas Purifier: A catalytic purifier removes oxygen from hydrogen feedlines just upstream of a fuel-cell stack
See 0332

FUEL OIL

Oil Burner With Nearly Stoichiometric Combustion: A method of vaporizing and mixing the fuel increases the thermal efficiency to 84 percent
See 0167

FUEL SLURRIES

Measuring Slurry Flow: Noncontact ultrasonic instrument is accurate and versatile
See 0520

FUELS

Alcohol/Petroleum Fuels for Diesel Engines: Blends of methanol, ethanol, water, and diesel fuels were formulated and evaluated
See 0300

Analytical Methods for Synfuel Production: Techniques sometimes produce differing results from laboratory-to-laboratory
See 0087

Assessing Landfill Gas Recovery Projects: Factors are provided for determining technical and economic feasibility of existing landfills
See 0303

Colloidal Liquid Fuel: Heavy petroleum fractions are extended with coal particles to form a pumpable fuel
See 0311

Draining Methane From Coal Mines: Removing gas before coal is mined speeds up production
See 0904

Dynamic Simulation of Chemical Processes: A variety of software packages are evaluated
See 0393

Environmental Data on Energy Technologies: Handbook shows environmental data for major energy technologies
See 0397

Hydrogen Production Driven by Fusion Reactor: Heat from the reactor blanket is joule-boosted to allow noncatalytic conversion of SO3 to SO2
See 0340

Low-Pressure Alcohol Distillation: Heat requirements are lowered for the process
See 0107

Methane Hydrate - a Curiosity or a Vast Energy Resource: This icelike mixture may become a major source of natural gas
See 0356

Methane-Based Fuels for Automotive Fleet Vehicles: Publication shows how to exploit an alternative fuel for cars and trucks
See 1016

New Catalytic Reactions Cut Energy Requirements: Reactions that ordinarily consume a large amount of energy proceed at much lower temperatures
See 0117

Quantitative Analysis of Fire-Resistant Fuel: Spectrophotometry monitors proportions of fuel, emulsifier, and water
See 0361

Removing Biostatic Agents From Fermentation Solutions: Liquid carbon dioxide is an inexpensive solvent
See 0883

Renewable Energy for Industry: Guidance is given for evaluating and financing biomass, waste, solar, and wind sources
See 0365

Retrofitting Diesels to Burn Alcohol: The problems and future potential of using ethanol as a fuel in diesel engines are discussed
See 0173

Short-Rotation Forestry: Current state-of-the-art and future research topics are described
See 0931

Waste Oils Fuel Navy Boilers
See 0443

FURNACES

Ceramic 1,500C Test Furnace: Unit is inexpensive, easy to construct, and requires little power to operate
See 0455

Fuel-Saving Oil Burners for Homes: Two approaches to improving the efficiency of furnaces and adapting them to lower heat demands are described
See 0641

Holder for Fragile Parts: A fixture with many springfingers holds irregularly-shaped parts
See 0648

Interstitial Collimating Holes for Gas-Levitation Microfurnace: Spaces between small rods direct gas flow
See 0661

Solar Rotary Kiln: Unit decomposes zinc sulfate and other low-absorptivity materials efficiently
See 0716

FUSION REACTORS

Hydrogen Production Driven by Fusion Reactor: Heat from the reactor blanket is joule-boosted to allow noncatalytic conversion of SO3 to SO2
See 0340

Low Temperature Properties for Fusion Magnets Are Produced
See 0266

GALLIUM ARSENIDES

Characterizing Aluminum/Gallium Arsenide Semiconductors: Mechanisms of operation are elucidated
See 0959

Gallium Arsenide Waveguide for Light: Molecular-beam epitaxy creates a structure having controllable properties
See 0970

Low-Cost GaAs Solar Cells: A silicon substrate lowers cost and increases efficiency
See 0352

Mixed Conduction in Semi-Insulating Gallium Arsenide: A new analytic technique allows more accurate calculations
See 0530

GAMMA DETECTION

Hand-Held Field Spectrometer: Portable spectrometer employs microprocessor to provide extended analysis of radiation sources
See 0936

Improvements in Gamma-Ray Coal-Level Sensors: Instrumentation is evaluated at an existing coal-gasification facility
See 0497

A Portable Radiation Monitor: Battery-operated monitor detects and identifies radiation on site
See 0547

Viewer Makes Radioactivity Visible: A battery-operated viewer could aid in contamination surveys and medical diagnoses
See 0585

GAMMA RAYS

Gamma Rays Kill Moth Larvae on Fruit
See 0861

GAMMA SPECTROMETERS

Hand-Held Field Spectrometer: Portable spectrometer employs microprocessor to provide extended analysis of radiation sources
See 0936

GAS ANALYSIS

Analysis of Polynuclear Aromatic Hydrocarbons in Particulate Matter by Luminescence Techniques
See 0381

GAS CHROMATOGRAPHY

Analytical Procedures for Aniline and Selected Derivatives in Wastewater and Sludge
See 0382

Characterization of Elastomer Vulcanizate Materials: Pyrolytic gas liquid-phase chromatography (PGC) identifies elastomers in sealing and connecting components of hydraulic system
See 0752

Improving Hydrocarbon Separation in Gas Chromatography: Modified silica spheres enhance chromatographic separation
See 0105

Leak Tester for Cryogenic Flowlines: A gas chromatograph measures leakage into cavity surrounding the joint under test
See 0505

GAS DETECTORS

Detecting Methane Leaks: A remote sensor uses laser radiation backscattered from natural targets
See 0462

Development of a Continuous Monitor for Detection of Toxic Organic Compounds
See 0469

Development, Design, and Operation of a Cascade Impactor
See 0470

Improved O2/H2 Gas-Mixture Sensor: Monitor of mixture concentration uses a catalyzed and an uncatalyzed temperature probe
See 0496

Submarine Air Monitoring System Improved
See 0564

Totally Optical Technique for Monitoring Ambient Non-Methane Hydrocarbons
See 0576

GAS DYNAMICS

Swirl Diffuser: A gas diffuser, based on swirling flow, dissipates the incoming gas velocity in a relatively short distance
See 0993

GAS FLOW

Boundary-Layer Equations for Two-Dimensional and Axisymmetric Flow: Finite-difference procedure solves for laminar, transitional, or turbulent flows
See 0957

Discriminating Between Liquid and Gas Flows: Variations in momentum density would change the position of a sensor
See 0474

Manometer Measures Gas Flow: Apparatus uses water displacement to measure gas flow at low rates
See 0513

Measuring Wide-Range Gas Flow: Accurate readings are made of flows ranging over three orders of magnitude
See 0527

New Hydraulic Analogy Instrument Tests Gasdynamic Flows
See 0537

GAS PIPELINES

Optical Receiver for a Prototype Remote-Sensing Natural Gas Leak Detector
See 0542

GAS PRODUCTION

Assessing Landfill Gas Recovery Projects: Factors are provided for determining technical and economic feasibility of existing landfills
See 0303

GAS SEALS

Improved Gas Seal for Electrolytic Cells: Breakage by differential thermal expansion is reduced
See 0103

GAS TURBINE BLADES

Turbin Blades Improved
See 0175

GAS TURBINE ENGINES

Jet Engines as High-Capacity Vacuum Pumps: A large diffuser operational envelope and long run times are possible
See 0165

GAS TURBINE NOZZLES

Oxidation-Resistant Columbium Nozzles: Investment casting and silicide coating are combined to yield strong heat-tolerant parts for gas turbines
See 0168

GAS TURBINE ROTORS

Depositing Sialon Coating on Turbine Rotors: Sialon layer is formed on a refractory substrate via chemical-vapor deposition
See 0162

Predicting Life of Ceramic Components in Gas Turbines: Experimental and analytical results are compared
See 0170

GAS TURBINES

Flow Through a Rotating Turbomachinery Blade Row: Full potential, transonic quasi-three-dimensional flow is calculated
See 0163

How Synfuels Behave in Gas Turbines: Combustion products can be different from those of petroleum-based fuels
See 0338

Integrally Cast Rotors for Turbines: The cost of machining separate rotor blades can be avoided
See 0659

A Multifuel, Low-Emission Gas Turbine: Variable-area air injector improves efficiency at all power levels
See 0416

Staging Two-Phase Turbines: Turbine efficiency is 70 percent with staging as compared to 63 percent without staging
See 0174

GASES

Estimating the Solubility of Gases in Battery Electrolytes: The estimates are in excellent agreement with experimental values
See 0326

Measuring Small Leak Holes: Hole sizes are deduced from pressure measurements
See 0521

GASIFIERS

Molten Slag Would Boost Coal Conversion: A proposed reactor would increase the residence time of unconverted char
See 0676

GASOHOL

Alcohol/Petroleum Fuels for Diesel Engines: Blends of methanol, ethanol, water, and diesel fuels were formulated and evaluated
See 0300

GAUCHERS DISEASE

New Tests for Gaucher's Disease Predict Nervous System Involvement
See 0875

GEARS

CAD/CAM Techniques for Forging Spiral Bevel Gears: Machining time and costs are substantially reduced
See 0599

Fracture Resistance in Carburized Steels: Study evaluates carburized steels for high-temperature service in helicopters
See 0782

Heat-Treating Gears by Laser: The procedure, which offers big savings in equipment and labor, is feasible but needs development
See 0645

Kinematic Errors in Spiral Bevel Gearing: Analysis reveals sources of error and how they can be corrected
See 0663

Reliability Model for Planetary Gear Trains: A probabilistic model provides a realistic estimate of life expectancy
See 0696

Thermal Elastohydrodynamic Lubrication of Spur Gears: Program and analysis predict lubricant film thickness and the variations of dynamic load and temperature
See 0838

Tooth-Profile Changes in Spiral-Bevel Gears: Mathematical analysis illuminates pressure angle relationships and other characteristics
See 0734

GELATINS

Three New Techniques for Floating Pollutant Spill Control and Recovery
See 0436

GELLING AGENTS

Gelled Anti-icing Agents: A gelling agent such as pectin is added to an antifreeze/water mixture
See 0099

GENETIC ENGINEERING

Gene Cloning May Sprout Super Seeds
See 0862

NICHD-Supported Scientists Design Test for Prenatal Diagnosis of PKU
See 0877

GENETICS

Feasibility of Applying Genetic Engineering Technology to Aquatic Plant Control is Studied
See 0856

GEOPHYSICAL SURVEYS

Natural Gas Prospects in the Devonian Shales of the Eastern United States: Comprehensive study provides evaluation of natural gas resources in the Devonian Shale
See 0922

GEOTHERMAL POWER PLANTS

Flash Degasser for Geothermal Fluid: Energy-conversion efficiency is increased for geothermal powerplants
See 0330

Geothermal Power Turbine: Velocity-pump reaction turbine is capable of up to 70 percent energy conversion
See 0333

GEOTHERMAL WELLS

Drill-Pipe Severing Tool for Geothermal Wells: Explosive device is compatible with high borehole temperatures
See 0905

GERMINATION

Gene Cloning May Sprout Super Seeds
See 0862

GLASS

Designing Glass Panels for Economy and Reliability: Method considers such factors as glass temper and load duration
See 0767

Dielectric Scanning Locates Voids in Glass Foam: Capacitive probes may succeed where X-ray and ultrasonic equipment do not
See 0471

Dissolving Bubbles in Glass: An analytical expression calculates the changes of bubble radius with time
See 0769

Fabrication of Structural Cellular Glass: A surface layer is quickly heated and compressed
See 0777

Freeze/Thaw Properties of Cellular Glass: Without moisture, temperature cycles do no harm
See 0783

Glass for Solar Concentrators: A survey evaluates engineering parameters of commercial glasses
See 0334

GLASSY POLYMERS

Cracks in Glass Polymers Induced by Solvent Absorption: The combination of soluble particles and absorbed solvents cause polymer cracking
See 0763

GRAPHITE REINFORCED COMPOSITES

Graphite/Epoxy Tow Bar: Composite bar is as strong as a conventional steel automotive tow bar
See 1012

Interface Reactions in Metal-Matrix Composites: An intermediate layer between fiber and matrix determines the mechanical properties of the composite
See 0792

GRAPHITE REINFORCED PLASTICS

Fabrication of Graphite/Epoxy Column Elements: Dimensionally precise columns are wound on vertical mandrels
See 0776

GRATINGS(SPECTRA)

Fabricating Grating Couplers on Optical Fibers: Microscopic corrugations are formed on fiber surfaces
See 0964

Simplified Laser Tuning: Tuning arrangement employs a single grating and two planar mirrors
See 0989

GREENHOUSES

Heating Greenhouses With Waste Heated Water: Industrial-waste heated water reduces greenhouse energy costs
See 0335

Solar Drying of Sludge: Greenhouse Versus Open Bed: The protection greenhouses afford against rain may not be necessary
See 0432

GROUND WATER

Rapid Assessment of Potential Ground-Water Contamination Under Emergency Response Conditions
See 0424

GROUT

Compatibility of Grouts with Hazardous Wastes
See 0389

Epoxy Grout With Silica Thickener: Grout cures quickly, even in the presence of hydraulic oil
See 0773

GUAYULE

Nonpetroleum Substitutes for Rubber: Several blends of reinforcement fillers are evaluated
See 0807

GUIDELINES

Guidelines for Monitoring Indoor Air Quality
See 0403

GUN BARRELS

Tube Recycling by Rotary Forging: Substantial cost savings are possible
See 0737

GYROSCOPES

Novel Fiberoptic Gyroscope Demonstrated
See 0541

HABITATS

Procedures For Airborne Sensors Are Developed
See 0551

HAND TOOLS

Tool for Tightening Bolts With Knurled Heads: A modified clamp transfers a torque to the bolthead
See 0732

HANDBOOKS

Energy and Air Quality: Handbook aids in planning the growth of energy facilities
See 0394

Energy and Solid/Hazardous Waste: Data are presented on wastes from a variety of energy technologies
See 0395

Energy Technologies and the Environment: A Handbook: The effects of key technologies over the next 20 years are examined
See 0396

Environmental Data on Energy Technologies: Handbook shows environmental data for major energy technologies
See 0397

Reducing Energy Costs in the Plastics Industry: A variety of simple, fast-payback methods are suggested
See 0364

HANDICAPPED PERSONS

Adjustable Walker for the Handicapped: The front legs adjust at the touch of a lever for use on stairs or ramps
See 0039

New Designs Have Been Developed for Personal Lifts
See 0058

Portable Communicator Has Been Developed for Non Vocal People
See 0062

HARNESSES

Cable Assembly and Harness Designs: Specifications for wiring harnesses used in severe environmental conditions of combat vehicles met by commercially available materials
See 0228

HARVESTING

Simulating Mechanical Control Operations: A computer model can simulate mechanical harvesting operations using any specific mechanical system operated in any realistic environment
See 0887

HAZARDOUS MATERIAL SPILLS

Evaluation of a Containment Barrier for Hazardous Material Spills in Watercourses
See 0400

HAZARDOUS MATERIALS

Air Land Water Analysis System (ALWAS): A Multi-Media Model for Toxic Substances
See 0379

Bromination Process for Disposal of Spilled Hazardous Materials
See 0387

Compatibility of Grouts with Hazardous Wastes
See 0389

Energy and Solid/Hazardous Waste: Data are presented on wastes from a variety of energy technologies
See 0395

Fail-Safe Transfer Line for Hazardous Fluids
See 0401

Low-Temperature Reactions for Waste Disposal: Toxic wastes can be made with low energy expenditure and small capital investment
See 0408

Mobile System for Extracting Spilled Hazardous Materials from Excavated Soils
See 0411

Recycling Lithium Carbonate/Lithium Hydroxide Waste: A hazardous-waste disposal problem is eliminated by regeneration
See 0425

Submarine Air Monitoring System Improved
See 0564

Surrogate Hazardous Wastes May Simplify Incinerator Monitoring
See 0435

Three New Techniques for Floating Pollutant Spill Control and Recovery
See 0436

Waste Disposal at Synthetic-Fuel Plants: Disposal is examined from engineering, environmental, and economic viewpoints
See 0442

HAZARDOUS WASTES

Rapid Assessment of Potential Ground-Water Contamination Under Emergency Response Conditions
See 0424

HEALTH PHYSICS
Multiple-Compartment Dosimeter: Radiation dose is measured at various depths
See 0869

HEART
Heart-Rate and Breath-Rate Monitor: Off-the-shelf components measure physiological rates to an accuracy of 1 pulse/minute
See 0049

HEART DISEASES
Implanted Defibrillator Improves Survival Rate of Cardiac Patients
See 0051

HEAT EXCHANGERS
Controlling Heat-Exchanger Outlet Temperature: Nearly constant temperature is maintained regardless of fluid flow
See 0612
Effectiveness of Cooling Garments: Water-cooled vests with portable heat exchangers are evaluated
See 0046
High-Temperature, High-Pressure Heat Exchanger: Gas-to-gas exchanger uses a molten transfer medium
See 0647
Stability of Tube Rows in Crossflow: Two instability mechanisms are identified in heat-exchanger tube bundles
See 0369

HEAT LOSS
Insulation Deficiencies And Their Effects On Heat Loss In Housing
See 0076

HEAT MEASUREMENT
Measuring Snow's Liquid Water Content
See 0522
Thermoelectric Heat-Flux Gage: Simple device yields accurate results
See 0573

HEAT PIPES
Variable-Conductance Heat-Transfer Module: Working lengths of heat pipes are electronically controlled
See 0739
Wicking Coating for Heat Pipes: Grooves in a porous coating are produced by flame-spraying over a wire mesh
See 0740

HEAT PUMPS
Thermoelectric Heat-Flux Gage: Simple device yields accurate results
See 0573

HEAT RECOVERY
Heating Greenhouses With Waste Heated Water: Industrial-waste heated water reduces greenhouse energy costs
See 0335
A Test for the Recovery of Waste Energy in a Fishing Vessel
See 0947

HEAT RESISTANT MATERIALS
Metal Coating Multifilamentary Yarns: Process provides uniformly coated fibers for reinforcing high-temperature composites
See 0802
Perfluoroalkylene-Ether Triazine Elastomers: New process yields a product that resists heat and the action of oxygen and water
See 0123

HEAT RESISTANT PLASTICS
Aromatic Polyimides With Group VI Linkages: Thermally-stable, solvent-resistant polyimides are readily processable by hot-melt techniques
See 0088
Making Thermoplastics Flame-Resistant: Elastomer-coated hydrate salts are added
See 0796
Removable Foam Encapsulants: Thermoplastic potting compound can be dissolved when necessary
See 0819

HEAT STORAGE
Aquifer Thermal-Energy Storage: A guide tells how to design and evaluate aquifer thermal-energy storage systems
See 0893
Bricks and Cans for Thermal Storage: Water-filled cans and bricks provide efficient thermal storage for solar space and hot-water heating
See 0305
Earth as a Residential Heat-Storage Medium: Heat is stored during hot months for use during cold months
See 0320
Heat Absorbing Gel Developed
See 0050
Sampling Aquifer Thermal-Energy Storage Systems: Guidelines are offered for gathering, storing, and analyzing water specimens
See 0366

HEAT TRANSFER
Hydrogen Production From Heavy Fuels: Better heat-transfer properties may avoid sulfur poisoning of the catalyst
See 0341
Predicting Thermal Conductivity: An empirical equation accurately predicts thermal conductivity in insulating materials
See 0811
Stability Test for Transient-Temperature Calculations: A graphical technique gives a rapid indication of stability or instability
See 0990
Two-Evaporator Refrigerator With Refrigerant Mixture: Results of optimization study are tested
See 0372

HEAT TREATMENT
Hardening Iron-Based Nickel/Cobalt/Titanium Alloys: Hardness depends on the titanium content and the type of heat treatment
See 0785
Heat-Treating Gears by Laser: The procedure, which offers big savings in equipment and labor, is feasible but needs development
See 0645

HEATING
Algorithm Developed For Best HVAC Start/top Times
See 0069

HEATING EQUIPMENT
Corrosion-Prevention for Steel Stovepipes: Several materials were found to extend the service life significantly
See 0759
Fuel-Saving Oil Burners for Homes: Two approaches to improving the efficiency of furnaces and adapting them to lower heat demands are described
See 0641
Improving a Guarded Hotplate: A modified outer guard ring is heated more uniformly
See 0498
Reliability Guidelines for Solar Hot-Water Systems: Document consolidates available information in one publication
See 0080
Solar Energy for Industrial Processes: Thermal systems could provide heat-delivery rates of 2.8 to 3.4 GJ/yr/sq m at a cost of $50/GJ/yr
See 0715
Water Panels for Passive Heating: Tankwall sections absorb solar energy with little reradiation to the outside
See 0083

HEAVY METALS
Process for Removing Heavy Metal from Water is Developed
See 0423

HELIOSTATS
A Heliostat Cost-Analysis Tool: A computerized model aids in the evaluation and comparison of heliostat cost estimates
See 0336

HEPA FILTERS
Evaluation of High-Efficiency Particulate Air Filters: Structural test results characterize ventilation filters for nuclear facilities
See 0632

HIGH PERFORMANCE LIQUID CHROMATOGRAPHY
Analytical Procedures for Aniline and Selected Derivatives in Wastewater and Sludge
See 0382

HISTOLOGY
Tissue Specimens Available for Pathology Studies
See 0891

HISTOPLASMOSIS
Laser Treatment May Prevent Blindness for Some Victims of Histoplasmosis
See 0053

HOISTS
New Designs Have Been Developed for Personal Lifts
See 0058

HOLDERS
Low-Temperature Laser-Rod Holder: Fragile laser rod is protected from thermally-induced mechanical stress
See 0974

HOLOGRAPHY
Holographic Interferometry for Large Structures: Whole vehicular components can be analyzed
See 0493
Multiple-Image Holographic Matched Filter: New technique for making holograms greatly increases storage density
See 0975
Simplified Laser Tuning: Tuning arrangement employs a single grating and two planar mirrors
See 0989

HONEYCOMB CORES
Low-Weight Inserts for Aluminum Honeycomb Panels: Fiber/epoxy composites would be used in place of solid aluminum
See 0795

HOT ISOSTATIC PRESSING
Turbin Blades Improved
See 0175

HOT WATER HEATING
Reliability Guidelines for Solar Hot-Water Systems: Document consolidates available information in one publication
See 0080

HOUSES
Insulation Deficiencies And Their Effects On Heat Loss In Housing
See 0076

HOUSINGS
Containment for Flywheels: R&D is proceeding on low-cost, reliable means for containing the fragments of disintegrating automotive flywheels
See 1008
Low-Temperature Laser-Rod Holder: Fragile laser rod is protected from thermally-induced mechanical stress
See 0974

HUMAN FACTORS ENGINEERING
Air Force Develops Subjective Workload Assessment Technique
See 0040
Binocular Overlap in a Fiber-Optic Helmet-Mounted Display Has Been Completed
See 0041

HYBRID MICROCIRCUITS
Reworking Packaged Hybrid Microelectronic Circuits: Equipment and processes have been developed for fast and economical delidding and resealing
See 0705

SUBJECT INDEX

HYBRIDOMAS

Hybridoma Data Bank Available
See 0863

HYDRAULIC EQUIPMENT

Remotely-Adjustable Pressure-Control Valve: The simple, low-cost design resists leakage and clogging
See 0698

Seawater Hydraulic Motor Under Development
See 0708

HYDRAULIC FLUIDS

Increasing Fluid Compressibility With Plastic Spheres: Suitability of various sphere materials is evaluated
See 0790

HYDRAULIC FRACTURING

Borehole Seismic Unit: Fracture orientation can be measured by using a triaxial geophone package located within the wellhole
See 0897

HYDRAZINE

Nitrogen Supply Uses Hydrazine: Liquid hydrazine is dissociated and residual gas removed to produce almost pure nitrogen
See 0120

HYDROCARBONS

Improving Hydrocarbon Separation in Gas Chromatography: Modified silica spheres enhance chromatographic separation
See 0105

Totally Optical Technique for Monitoring Ambient Non-Methane Hydrocarbons
See 0576

HYDROELECTRIC POWER GENERATION

Environment and Small-Scale Hydroelectric Development
See 0325

National Appropriate Technology Assistance Service Established: The service provides engineering, scientific and commercialization technical assistance for energy-related technologies
See 0357

HYDROGEN

Cooling by Para-to-Ortho-Hydrogen Conversion: A catalyst speeds the conversion, increasing the capacity of a solid-hydrogen cooling system
See 0095

Improved Coil for Hydrogen Dissociators: The flat coil has a rigid printed-circuit substrate
See 0971

Improved O2/H2 Gas-Mixture Sensor: Monitor of mixture concentration uses a catalyzed and an uncatalyzed temperature probe
See 0496

Intermetallic Absorber for Hydrogen: A new compound offers a medium for separating hydrogen from other gases
See 0106

National Tritium Labeling Facility
See 0870

HYDROGEN FLUORIDE LASERS

Fluorine Mixer/Vaporizer for Chemical Lasers: The fluorine is vaporized by a flow of helium
See 0968

HYDROGEN PRODUCTION

Hydrogen Production Driven by Fusion Reactor: Heat from the reactor blanket is joule-boosted to allow noncatalytic conversion of SO3 to SO2
See 0340

Hydrogen Production From Heavy Fuels: Better heat-transfer properties may avoid sulfur poisoning of the catalyst
See 0341

Solar Rotary Kiln: Unit decomposes zinc sulfate and other low-absorptivity materials efficiently
See 0716

HYDROGENATION

Catalyst for Hydrogenation of CO: An improved catalyst reduces the costs of separating olefins from paraffins
See 0089

Desulfurizing Coal by Chlorinolysis and Hydrogenation: A two-process combination removes more sulfur than either process alone
See 0391

HYDROLYSIS

Removing Biostatic Agents From Fermentation Solutions: Liquid carbon dioxide is an inexpensive solvent
See 0883

HYDROPHILIC POLYMERS

Moisture-Transmitting Polymers: The vapor transmissivity and physical properties of hydrophilic polyurethane films qualify them for a variety of applications
See 0113

HYDROPONICS

Wastewater Treatment with Plants in Nutrient Films
See 0444

HYPERKINESIS

New Monitor Allows Evaluation of Hyperactive Children
See 0059

ICE MAKERS

Portable Icemaking System is Developed
See 0684

ILLUMINATING

Tritium Radioluminescent Lighting Developed for Remote Sites
See 1021

IMAGE PROCESSING

Automated Plankton Sorting System
See 0844

Digital Filters for Two-Dimensional Data: Computationally efficient filters speed the processing of two-dimensional experimental data
See 0199

Forest Resource Information System: Twenty-three processing functions aid in utilizing LANDSAT data for forest resource management
See 0910

Sharp-Focus Composite Microscope Imaging by Computer: Enhanced depth of focus aids medical analysis
See 0561

Software For Image Manipulation
See 0217

VLSI Unit for Two-Dimensional Convolutions: Proposed chip could be used for a variety of functions
See 0223

IMIDES

Improved Thermosetting Imide Resins: The modified resins have a lower curing temperature
See 0788

IMMUNE SERUMS

New Standard Antibody Sera Are Now Available From CDC
See 0873

IMMUNOASSAY

Digital Filter for Detecting Infectious Diseases: Low-speed, low-pass filter extracts information from noise-obscured data
See 0045

IMMUNOLOGIC DISEASES

Serological Detection of Antibodies to HTLV-III in Sera of Patients with AIDS and pre-AIDS Conditions
See 0885

IMMUNOLOGY

Live, Recombinant Virus Vaccine May Play Key Role in Disease Prevention
See 0867

Method of Continuous Production of Retroviruses (HTL V-III) from Patients with AIDS and pre-AIDS
See 0868

NIAID Researchers Create Potential Live, Recombinant Virus Vaccine
See 0876

IMPACT

Acoustic Design Improves Composite Impact Resistance: Composite acoustic response to impact should be included in design criteria
See 0743

Modified Oscillograph for Impacting Composite Materials: A commercial instrument is modified to impart energy in a realistic manner
See 0531

IMPLANTATION

Implanted Defibrillator Improves Survival Rate of Cardiac Patients
See 0051

IMPLANTS

New System For Administering Chemotherapy Is Developed
See 0874

INCINERATORS

Surrogate Hazardous Wastes May Simplify Incinerator Monitoring
See 0435

INCLUSIONS

Preparation of Steel Specimens for Inclusion Assessment: Two metallographic sample preparation methods produce flat, scratch-free surfaces without losing the inclusions
See 0812

INDOOR AIR POLLUTION

Guidelines for Monitoring Indoor Air Quality
See 0403

How to Reduce Shearer Operators' Dust Exposure By Using Remote Control
See 0913

Longwall Coal Mine Respirable Dust Sources
See 0407

Reducing Longwall Face Workers' Respirable Dust Exposure From Roof Support Movement
See 0928

Submarine Air Monitoring System Improved
See 0564

INDUCTION HEATING

Absorbable-Susceptor Welding of Ceramics: The susceptor would become part of the joint
See 0592

INDUSTRIAL ATMOSPHERES

Controlling Industrial Noise: A handbook gives theoretical background and practical advice
See 0613

INDUSTRIAL HYGIENE

How to Reduce Shearer Operators' Dust Exposure By Using Remote Control
See 0913

Occupational Health Information System Developed
See 0878

Occupational-Safety Workshops: Safety-management-control programs are offered
See 0879

Optical-Fiber Dosimeter: Portion of red-to-blue light spectrum transmitted indicates radiation dose
See 0543

Reducing Longwall Face Workers' Respirable Dust Exposure From Roof Support Movement
See 0928

Standards For Toxic Metals In Human Urine Are Developed
See 0133

Tiny Radiation Warning Devices: Miniature radiation warning device that enhances nuclear industry worker safety
See 0438

INDUSTRIAL MEDICINE

Longwall Coal Mine Respirable Dust Sources
See 0407

INDUSTRIAL PLANTS

Battery Grid for Submarines May Have Industrial Uses
See 0748

INDUSTRIAL WASTE TREATMENT

Process for Removing Heavy Metal from Water is Developed
See 0423

Treating Wastewater From Coal Liquefaction: Treatment process reduces pollutant concentrations below EPA levels
See 0439

INDUSTRIAL WASTES

Industrial Waste Exchanges: Industrial wastes of one company can be a valuable resource to another
See 0404

Monitoring the Thickness of Coal-Conversion Slag: Proposed technique adapts analogous ocean-floor-mapping technology
See 0415

INDUSTRIES

Conserving Energy in the Iron and Steel Industry: An analysis of energy and materials flows shows opportunities and obstacles to energy conservation
See 0314

INERTIAL GUIDANCE

Angular Measurements in Gimbal-Mounted Sensors: Fiberoptic lightguide pickoff has good signal resolution and accuracy without disadvantages of mechanical inertial-guidance systems
See 0450

INFECTIOUS DISEASES

Digital Filter for Detecting Infectious Diseases: Low-speed, low-pass filter extracts information from noise-obscured data
See 0045

INFLATABLE STRUCTURES

Inflatable Rescue Capsules: Rescue spheres transfer people from a disabled vehicle to a rescue vehicle
See 1002

INFORMATION SERVICES

Hybridoma Data Bank Available
See 0863

National Appropriate Technology Assistance Service Established: The service provides engineering, scientific and commercialization technical assistance for energy-related technologies
See 0357

INFORMATION SYSTEMS

Asbestos Removal And Disposal Information System
See 0385

Environmental Satellite Data and Information
See 0033

Forest Resource Information System: Twenty-three processing functions aid in utilizing LANDSAT data for forest resource management
See 0910

Information-Systems Data-Flow Diagram: A single form presents a clear picture of an entire system
See 0206

Occupational Health Information System Developed
See 0878

The Ocean Pollution Data and Information Network (OPDIN)
See 0944

INFRARED DETECTION

Uncooled IR Detector: Detector combines a liquid-crystal film with a light-sensitive solid-state array
See 0581

INFRARED DETECTORS

Growing Crystals for Infrared Detectors: Unidirectional solidification yields bulk crystals with compositional homogeneity
See 0489

INFRARED THERMOGRAPHY

Detecting Defective Solder Bonds: The method is noncontact and nondestructive
See 0618

INGOTS

Inspecting Ingots and Preforms Prior to Hot Forging: Focused ultrasonic beams quickly and rapidly test steel ingots before rotary forging
See 0658

INJURIES

Investigators Work to Reduce Effects of Traumatic Eye Injuries
See 0864

INORGANIC SULFIDES

New Treatment Has Been Developed For Tannery Waste Water Containing Sulfides
See 0418

INPUT OUTPUT DEVICES(COMPUTERS)

IBM Channel to PDP11 Interface: An interface permits bidirectional data transfer between the two systems
See 0205

INSULATION

Flexible Vinyl Strip Doors Decrease Heat Loss
See 0074

Insulation Cuts Steam Use: Payback for insulating nitrocellular boiling tubs is less than four years
See 0344

Light, Serviceable Insulation Blanket: New features are a lighter facing and easy-to-use fastening system
See 0347

INTEGRATED CIRCUITS

Computer Models for IC Fabrication: Process simulations are described for computer-aided design
See 0607

Computer Models for VLSI Fabrication Processes: A completely new, advanced computer program is now available
See 0608

Effect of Cosmic Rays on MSI Devices: Low-power logic devices are susceptible to cosmic-ray particles
See 0236

Effects of Heavy-Charged Particles on MOS IC's: Although such particles are not troublesome now, they could be in the future
See 0237

Improving Trace-Ion Sensitivity: Background noise is reduced by some special precautions
See 0656

Insulated-Metal Substrates for Hybrid Integrated Circuits: Mass-production potential is evaluated
See 0262

Low-Temperature Water Diffusion in SiO2 Thin Films: Nuclear-resonance profiling looks into the formation mechanism of IC thin films
See 0109

Modernized Electronic Manufacturing Facility: Fabrication and testing capabilities are described
See 0272

New Program Will Analyze Microelectronic Test Data
See 0274

Test Pattern for IC's: Random-fault densities are measured in an array of standard structures
See 0570

Universal Pin Electronics Tester: Improved performance and reliability are obtained at reduced cost
See 0582

VLSI Unit for Two-Dimensional Convolutions: Proposed chip could be used for a variety of functions
See 0223

INTERFEROMETERS

Instrument Measures Airflow Friction Without Contact: A laser interferometer monitors the thickness of a shearing oil film
See 0501

New Interferometer System Developed For Field Testing of Large Mirrors
See 0538

INTERPOLATION

Obtaining Runge-Kutta Solutions Between Time Steps: A new interpolation method is used with existing Runge-Kutta algorithms
See 0980

INVENTORY CONTROL

Shuttle Inventory Management: All supply activities and requirements are controlled from a single point
See 1007

Spare Parts Inventory Control System Software
See 0221

INVESTMENT CASTINGS

Oxidation-Resistant Columbium Nozzles: Investment casting and silicide coating are combined to yield strong heat-tolerant parts for gas turbines
See 0168

ION CHROMATOGRAPHY

Ion Chromatography Monitors Environmental Waters: New technique provides rapid results with high accuracy
See 0405

ION EXCHANGING

Ion Chromatography Monitors Environmental Waters: New technique provides rapid results with high accuracy
See 0405

Process for Removing Heavy Metal from Water is Developed
See 0423

ION IMPLANTATION

Chromium Ion Implantation Can Prevent Corrosion in Steel Bearings Used in Navy Aircraft
See 0002

Computer Models for IC Fabrication: Process simulations are described for computer-aided design
See 0607

IONIZED GASES

Blowing Dust Away With Electrostatic Wind: Ionized air molecules drive away contaminants
See 0226

IRON ALLOYS

Hardening Iron-Based Nickel/Cobalt/Titanium Alloys: Hardness depends on the titanium content and the type of heat treatment
See 0785

IRON AND STEEL INDUSTRY

Conserving Energy in Scrap Iron and Steel Facilities: Energy costs can be reduced by 20 or more percent
See 0756

Conserving Energy in the Iron and Steel Industry: An analysis of energy and materials flows shows opportunities and obstacles to energy conservation
See 0314

IRRADIANCE

Pyrheliometer With Improved Accuracy, Instrument maintains components at constant temperature and allows tenfold improvement in instrumental accuracy
See 0553

IRRADIATED FOODS

Food Irradiation Expertise is Developed
See 0859

IRRADIATION

Gamma Rays Kill Moth Larvae on Fruit
See 0861

IRRIGATION

New Technology Stretches Scarce Water for Irrigation
See 0028

ISOSTATIC PRESSING

Hot Isostatic Pressing (HIP) Technique Can Improve Certain Alloys Used in Aircraft Engine Turbine Blades
See 0164

Turbin Blades Improved
See 0175

JET ENGINE NOISE

Reducing Aircraft-Engine Noise: Shock structure is modified to eliminate the associated noise
See 0172

JET ENGINES
Hot Isostatic Pressing (HIP) Technique Can Improve Certain Alloys Used in Aircraft Engine Turbine Blades
See 0164
PANEL Code for Planar Cascades: Plane cascade flow is solved using improved surface-singularity methods
See 0169
Turbin Blades Improved
See 0175

JET PUMPS
Jet Engines as High-Capacity Vacuum Pumps: A large diffuser operational envelope and long run times are possible
See 0165

JITTER
Method Has Been Developed to Remove Effects of Time Jitter
See 0528

JOINING
New Method of Joining Optical Fibers Is Developed
See 0978

JOINTS(JUNCTIONS)
Leak Tester for Cryogenic Flowlines: A gas chromatograph measures leakage into cavity surrounding the joint under test
See 0505
Self-Alining Quick-Connect Joint: Tapered joint is compact and lightweight
See 0709

KEVLAR RESINS
More Durable Tread for Tracked Vehicles: Aramid fibers added to tread rubber seem to increase durability
See 0804
Plasma Treatment of High-Strength Fibers: Continuous process yields large quantities of wettable fibers for lamination
See 0808
Properties of Wet Kevlar/Epoxy Composites: Wet and dry materials are compared and reasons for differences are explored
See 0816

KIDNEY
Transducer Joint for Kidney-Stone Ultrasonics: Improved mounting allows joint to last long enough for effective treatment
See 0065

LABELED SUBSTANCES
National Tritium Labeling Facility
See 0870

LABORATORIES
National Voluntary Laboratory Accreditation Program
See 0534
New Directory Of Accredited Laboratories
See 0536

LABORATORY ANIMALS
Animal Tissue Specimens Available
See 0843
Special Primate Specimens Are Now Available
See 0888

LAMINATES
Plasma Treatment of High-Strength Fibers: Continuous process yields large quantities of wettable fibers for lamination
See 0808
Singularities in Laminated Composites: Stress concentrations at free edges and contact edges are analyzed
See 0829

LAND POLLUTION
Environmental Hazards of TNT: Reactions between TNT and soil components are discussed
See 0398

LAND USE
Flood Damage Database Updating Uses LANDSAT
See 0145

LANDSAT
LANDSAT Emergency Access and Products (LEAP)
See 0148

LANDSAT SATELLITES
Flood Damage Database Updating Uses LANDSAT
See 0145

LASER APPLICATIONS
Annealing Solar Cells With Lasers: Large-area process removes ion damage
See 0301
Computer-Controlled Laser Welding: Limited access joints in a gas-turbine recuperator are welded using a moving-mirror, computer-controlled CO2 laser
See 0609
Determining Crystal Orientation by Laser Diffraction: Rapid, accurate method employs inexpensive equipment and requires minimal sample preparation
See 0962
Formation of Supersaturated Alloys for Semiconductor Device Applications
See 0249
Heat-Treating Gears by Laser: The procedure, which offers big savings in equipment and labor, is feasible but needs development
See 0645
Highly Stable Lasers for Precision Tests Developed
See 0492
Instrument Measures Airflow Friction Without Contact: A laser interferometer monitors the thickness of a shearing oil film
See 0501
Laser Treatment May Prevent Blindness for Some Victims of Histoplasmosis
See 0053
Melt-Level Sensing in Silicon-Web Growth: The shift of a laser beam reflected from the melt surface is sensed by a position detector
See 0675
Microwave Radiation Detector: A direct photon detector responds to microwave frequencies
See 0270
National Laser Users Facility: Experiments in High Energy-Density Physics
See 0938
Optical Receiver for a Prototype Remote-Sensing Natural Gas Leak Detector
See 0542

LASER BEAMS
Broadly Tunable Picosecond IR Source: Source produces continuously tunable, high-power radiation in the 10- to 20-micro m band
See 0958
Simplified Laser Tuning: Tuning arrangement employs a single grating and two planar mirrors
See 0989
System Measures Low-Level Laser Pulses
See 0569

LASER MATERIALS
Materials for Fluorine-Rich Environments
See 0798

LASER RANGE FINDERS
Self-Modulated Laser Rangefinder: Longitudinal resonance modes are exploited
See 0560

LASER SPECTROSCOPY
Laser-Based Vacuum Ultraviolet Spectrometer
See 0504
Resonance Ionization Mass Spectrometry
See 0131

LASER TARGETS
Fabrication of Hollow Spheres: A nozzle forms gas-filled spherical shells of high dimensional uniformity
See 0935

LASER VELOCIMETERS
Improved Laser Velocimeter: It can monitor fluid motion in three dimensions
See 0494

LASERS
Controlling Metal-Halide Vapor Density in Lasers: Streams of buffer gas convect and dilute the metal-halide vapor
See 0961
Fluorine Mixer/Vaporizer for Chemical Lasers: The fluorine is vaporized by a flow of helium
See 0968
Improved Cooling System for Organic Dye Lasers: Complexity and expense are substantially reduced
See 0972
Low-Temperature Laser-Rod Holder: Fragile laser rod is protected from thermally-induced mechanical stress
See 0974
Measuring Excess Noise in SDL's: A simple system measures noise deviation in semiconductor-diode lasers
See 0516
Multiple-Wavelength Metal/Halide Laser: A single device produces multiple lasing lines
See 0976
Pulsed Gas Laser-Pumping System: Higher laser efficiencies are obtained
See 0983
Scanning XeCl Laser: Potential applications of the narrow-bandwidth laser include remote sensing and high-resolution spectroscopy
See 0986
Tuning System for High-Power CO2 Lasers: Problems associated with unstable resonators are minimized
See 0997

LATCHES
Retractable Rotating Door Latch: After release, the latch withdraws out of sight
See 0703
Self-Locating Latch: A latch locates fittings without using electronic sensors
See 0710

LAUNCHING BASES
Estimating Design Loads in Coupled Vibrating Structures: Approximate spectral analysis is faster and less expensive than transient analysis
See 1001

LEAD ACID BATTERIES
Power System for Electrical Vehicles is Being Developed
See 1018

LEAD(METAL)
Instrument is Developed to Measure Lead in Human Tibia
See 0500

LEAK DETECTION
Fail-Safe Transfer Line for Hazardous Fluids
See 0401

LEAK DETECTORS
Detecting Methane Leaks: A remote sensor uses laser radiation backscattered from natural targets
See 0462
Leak Tester for Cryogenic Flowlines: A gas chromatograph measures leakage into cavity surrounding the joint under test
See 0505
Measuring Small Leak Holes: Hole sizes are deduced from pressure measurements
See 0521
Optical Receiver for a Prototype Remote-Sensing Natural Gas Leak Detector
See 0542

LEAK TESTS
Better Performance from Line and Check Curtains
See 0895
Calculating Static-Seal Leakage Correlation: Operational leakage rates of various working fluids are predicted from test data
See 0750

LEAST SQUARES METHOD
Computer Programs Have Been Developed for Nonlinear Least Squares
See 0194

LENSES
New Visual Aids Developed For Operational Pilots
See 0061
Precise Measurement of Effective Focal Length: Computerized instrument measures effective focal lengths to 0.01 percent accuracy
See 0549
Secondary-Spectrum-Free Lens System: Inclusion of a calcium fluoride element allows all aberrations to be reduced to insignificant levels
See 0987

LESIONS
Computer Program Uses Fundamental Neuroanatomy as the Basis for Interpreting Patient Data
See 0850

LEVITATION
Acoustic Levitation With Less Equipment: Certain chamber shapes require fewer than three acoustic drivers
See 0447
Acoustical-Levitation Chamber for Metallurgy: The sample can be moved to different positions for heating and quenching
See 0744
Classifying Particles by Acoustic Levitation: Separation technique is well suited to material processing
See 0603
Quenching Alloys in Containerless Processing: Gas quenching would be combined with magnetic levitation
See 0693

LEVITATORS
Containerless-Processing Module: Specimens are melted, manipulated, and solidified without contact
See 0610
Electrostatic Levitator With Feedback Control: Sample position is automatically maintained
See 0630
Gas-Bearing Crucible for Shot Tower: Device protects molten drops
See 0642
Hollow-Sphere Production Line: After initial formation, spheroids are processed without the contaminating touch of solid objects
See 0651
Interstitial Collimating Holes for Gas-Levitation Microfurnace: Spaces between small rods direct gas flow
See 0661
Phase Modulation Varies Average Acoustic Torque: Rotation of acoustically levitated objects can be controlled
See 0679
Producing Metallic Glasses With Acoustic Levitation: Acoustic fields support and cool liquid particles
See 0814

LIFE SUPPORT SYSTEMS
Recycling Lithium Carbonate/Lithium Hydroxide Waste: A hazardous-waste disposal problem is eliminated by regeneration
See 0425
Submarine Air Monitoring System Improved
See 0564

LIGHT PULSES
Broadly Tunable Picosecond IR Source: Source produces continuously tunable, high-power radiation in the 10- to 20-micro m band
See 0958
Obtaining Pulses From a CW Laser: Two acoustooptic modulators operate in tandem
See 0979

LIGHT SCATTERING
Diffusion Measurements in Microemulsions: Polarography yields the same value of diffusion coefficients as quasi-elastic light scattering (QLS)
See 0096

LIGHTING EQUIPMENT
Lighting-Control Strategies That Save Energy: Two automatic-control schemes offer substantial energy savings for commercial buildings
See 0348
Solid-State Ballasts for Fluorescent Lamps: Major savings in lighting energy can be realized
See 0289

LIGHTING SYSTEMS
Tritium Radioluminescent Lighting Developed for Remote Sites
See 1021

LIGHTNING PROTECTION
The Design of Lightning Protection: Engineering study could guide the design and monitoring of lightning protection
See 1000

LIGNIN
Monitoring Lignin Content in Paper Processing: Feedstock and finished pulp can be analyzed and controlled automatically
See 0114

LIMITER CIRCUITS
DC Switching System Rapidly Limits and Interrupts Fault Currents
See 0901

LINEAR ACCELERATORS
Improved Heavy-Ion Linac: Radio-frequency quadrupole linac biomedical and nuclear research potentials
See 0973

LIQUEFIED NATURAL GAS
Coaxial Pipe for Liquid Natural Gas: System provides ultrareliable protection against leaks
See 0604

LIQUID CRYSTALS
Uncooled IR Detector: Detector combines a liquid-crystal film with a light-sensitive solid-state array
See 0581

LIQUID FLOW
Discriminating Between Liquid and Gas Flows: Variations in momentum density would change the position of a sensor
See 0474

LIQUID LEVEL INDICATORS
Coolant-Level Sensors for Nuclear Reactors: Proposed sensors detect the loss of coolant at an early stage of an accident
See 0460
Level Sensor for Cryogenic Fluids: Comparator circuit is used with a hot-wire sensor
See 0507

LIQUID METALS
Magnetic Flowmeter for Electrically Conductive Fluids: Improved accuracy is provided with minimum recalibration requirements
See 0510

LIQUID WASTE DISPOSAL
Alternate Treatment of Organic Solvents and Sludges from Metal Finishing Operations
See 0380

LIQUID WASTES
Bromination Process for Disposal of Spilled Hazardous Materials
See 0387
Fail-Safe Transfer Line for Hazardous Fluids
See 0401
Generating SiF4 From H2SiF6: Sodium and barium fluorosilicates are precipitated and then thermally decomposed into silicon tetrafluoride
See 0100
Removal and Recovery of Silver From Photographic and Photoreproduction Effluents
See 0427
Waste Oils Fuel Navy Boilers
See 0443

LIQUIDS
Dispensing Small Measured Volumes of Liquid: Unit measures, filters, and unloads oil into a container
See 1009

LITHIUM CELLS
Improved Negative Electrodes for Secondary Cells: Additives significantly improve cell capacity and stability over multiple discharges
See 0342
Interelectrode Separator for Lithium Cells: Enhanced wettability is obtained
See 0346
Lithium/ulfuryl Chloride Battery: Safety and long shelf life are sought
See 0349
Lithium/Vanadium Oxide Storage Cells: Year-long study reveals high charge retention
See 0350
Primary Lithium/Organic Electrolyte Battery: Nonhazardous, high-temperature operation is obtained
See 0360
Rechargeable Secondary Lithium Battery: Flat-plate 10- and 20-Ah batteries are demonstrated
See 0362
Ternary Compound Electrodes for Molten-Salt Cells: Corrosion is reduced, and fabrication is simplified
See 0371

LITHIUM SULFUR DIOXIDE CELLS
Primary Lithium/Organic Electrolyte Battery: Nonhazardous, high-temperature operation is obtained
See 0360

LITHIUM SULFURYL CHLORIDE CELLS
Cathode Corrosion in Lithium/ulfuryl Chloride Batteries: Causes and cures of short shelf life are examined
See 0308
Evaluating Lithium Sulfuryl Chloride Batteries: With development and selection of suitable materials, practical high-energy-density batteries can be built
See 0327
Lithium/ulfuryl Chloride Battery: Safety and long shelf life are sought
See 0349

LITHIUM THIONYL CHLORIDE CELLS
Catalysts for Lithium/Thionyl Chloride Cells: Organic compounds of iron or cobalt improve voltage and capacity of electrochemical cells
See 0090

LITHIUM VANADIUM OXIDE CELLS
Lithium/Vanadium Oxide Storage Cells: Year-long study reveals high charge retention
See 0350

LIVESTOCK
Improved Cattle Hauler: Better aerodynamics and ventilation would increase fuel efficiency and decrease shipping losses
See 1013

LOAD MANAGEMENT
Load Management for Residential Photovoltaic Systems: A simulation of a utility-connected photovoltaic system shows that onsite utilization of photovoltaic-generated electricity is decoupled from system value at reasonable buyback rates
See 0351

LOADS(FORCES)
Measuring Locomotive Drawbar Pull: A coupler pin becomes an accurate and rugged force sensor
See 0517
Methods for Estimating Payload/Vehicle Design Loads: Several methods are compared with respect to accuracy, design conservatism, and cost
See 1003

LOCKHOPPER VALVES

Lockhopper Valves for Coal Gasifiers: Better valves are under development
See 0666

LOCKS(FASTENERS)

Lock for Tube Fittings: Covers for the fitting nuts engage to secure the fittings
See 0665

Retractable Rotating Door Latch: After release, the latch withdraws out of sight
See 0703

Spindle-Locking Mechanism: A cam-action lock has zero backlash
See 0718

LOCOMOTIVES

Measuring Locomotive Drawbar Pull: A coupler pin becomes an accurate and rugged force sensor
See 0517

LOGIC CIRCUITS

Effect of Cosmic Rays on MSI Devices: Low-power logic devices are susceptible to cosmic-ray particles
See 0236

LONGWALL MINING

Longwall Coal Mine Respirable Dust Sources
See 0407

LOSS OF COOLANT

Coolant-Level Sensors for Nuclear Reactors: Proposed sensors detect the loss of coolant at an early stage of an accident
See 0460

LOW BTU GAS

Dewatering Peat With Activated Carbon: A proposed process should produce enough gas and carbon to sustain itself
See 0319

LOW TEMPERATURE TESTS

Low Temperature Concrete Mortar Properties Are Detailed
See 0509

LUBRICANTS

Dispensing Small Measured Volumes of Liquid: Unit measures, filters, and unloads oil into a container
See 1009

Thermal Elastohydrodynamic Lubrication of Spur Gears: Program and analysis predict lubricant film thickness and the variations of dynamic load and temperature
See 0838

LUBRICATING OILS

Lubricant Effects on Transmission Power Loss: Several lubricants are evaluated for mechanical efficiency
See 1014

Measuring Additive Concentrations in Lubricating Oils: Nuclear magnetic resonance provides qualitative and quantitative information on key additives
See 0799

Removing PCB's From Oils: Contaminated oil can be cleansed and recycled, and the PCB's disposed of in the prescribed manner
See 0428

LUBRICATION SYSTEMS

Air-Lubricated Lead Screw: Submicrometer accuracy is anticipated
See 0593

MACHINE TOOLS

Circuitry for Angle Measurements: An angle resolver is pulsed and read under microprocessor control
See 0457

Materials Laboratory Demonstrates Automated Sheet Metal Blanking Cell
See 0674

Spindle-Locking Mechanism: A cam-action lock has zero backlash
See 0718

Tool Enlarges Hard-to-Reach Holes: Tool centers itself and cuts to a precise depth
See 0728

Tooling Converts Stock Bearings to Custom Bearings: Grinding process uses a special bearing holder
See 0733

MACHINERY

Shock Mounting for Heavy Machines: Elastomeric bearings eliminate extraneous forces
See 0713

MACHINING

Electric-Discharge Machining of Thin Slots: By promoting oil-bath circulation, new method allows 0.01-in. slots to be cut
See 0625

Electrochemical Deburring: The technical and economic capabilities of the process are characterized
See 0627

Electrolytic Sharpening of Diode-Contact Whiskers: Phosphor bronze wire is pointed without highly-toxic chemical reagents
See 0239

High-Speed Metal Removal: Ceramic inserts provide higher cutting speeds and longer life
See 0646

Machining Dovetails Efficiently: A cross-axial milling technique is fast and precise
See 0670

Machining Three Prongs on a Shaft: A simple tool reduces set-up and machining time
See 0671

Robotic Off-Line Programming Applications Is Demonstrated
See 0706

Tooling Converts Stock Bearings to Custom Bearings: Grinding process uses a special bearing holder
See 0733

MAGNESIUM PHOSPHATES

Magnesium Polyphosphate Cement Concrete: Concrete repair material for use under wet conditions and temperature extremes
See 0150

MAGNETIC BEARINGS

Passive Magnetic Bearing: A torsion wire assists permanent-magnet elements in maintaining shaft centering
See 0678

MAGNETIC FIELDS

Primer is Developed for Measuring 60-Hz Fields
See 0550

Superconducting High-Magnetic Field Lab Pays Off
See 0567

MAGNETIC FLOWMETERS

Magnetic Flowmeter for Electrically Conductive Fluids: Improved accuracy is provided with minimum recalibration requirements
See 0510

MAGNETS

Rare Earth/Cobalt Permanent Magnets: Magnets allow significant simplifications in circuit design
See 0285

MAINTENANCE

Economic Analysis of Bearing Refurbishment: Restoring used bearings can provide substantial savings
See 0622

Electrodeposition Repair of Damaged Metal Parts: Damaged material is replaced by electrodeposited copper
See 0628

More-Uniform Heat Curing for Structural Repairs: A copper lining helps to distribute the heat under a heating blanket
See 0805

Repairing Damaged Power-Cable Insulation: Simple method saves time, money, and material
See 0287

Repairing Defective Welds: Welds are reinforced by electrodeposition
See 0699

MAINTENANCE EQUIPMENT

Spray Machine For Applying A Polymer Resin Overlay To Road Surfaces
See 0157

MANAGEMENT

Control of Self-Replicating Systems: Three concepts are proposed for system management and control
See 0198

MANIPULATORS

Improving Control of Remote Manipulators: Commands and sensor signals are processed by computer to improve performance feel
See 0655

Remote Manipulator Has Realistic Feel: The operator feels the load but not the manipulator inertia or friction
See 0697

Task Board Tests Manipulator Performance: Robotics systems can be quantitatively evaluated
See 0723

Three-Fingered Robot Hand: Mechanical joints and tendons resemble those of a human hand
See 0726

Three-Level Control of Manipulators: Hierarchical control yields fast response
See 0727

MANNED SPACECRAFT

Photographic Film Tested on Space Shuttle Flights
See 1005

Shell-Tile Thermal-Protection System: Upper and lower interlocking caps enclose flexible lightweight insulation
See 1006

MANOMETERS

Manometer Measures Gas Flow: Apparatus uses water displacement to measure gas flow at low rates
See 0513

MAPS

Sea Surface Temperature Maps for Fishermen
See 0030

Video Disks Make Maps Manageable
See 0933

MASS SPECTROMETERS

Clinical Mass Spectrometers Are Now Available
See 0458

MASS SPECTROSCOPY

Monitoring Lignin Content in Paper Processing: Feedstock and finished pulp can be analyzed and controlled automatically
See 0114

Negative Ion Chemical Ionization Mass Spectroscopy (NICIMS) Successfully Detects Trace Compounds
See 0115

Resonance Ionization Mass Spectrometry
See 0131

Resonance Ionization Mass Spectrometry
See 0557

MATERIALS

Random Life Curves for Common Engineering Materials: Program incorporates non-Rayleigh effects in evaluating structure life
See 0984

MATERIALS HANDLING

Fail-Safe Transfer Line for Hazardous Fluids
See 0401

Low-Contamination Vibrating Feeder for Silicon Chips: Making the trough top surface out of semiconductor-grade silicon would reduce contamination
See 0668

Material Handling Systems for Large Tubes: Handling time can be cut in half
See 0673

Transporter for Treated Sheet Materials: Plastic spacers keep parts separated during transport or storage
See 1020

SUBJECT INDEX

MATERIALS RECOVERY

Assessment of Landfill Methane Recovery: An assessment of the pros and cons and an annotated bibliography provide information on this untapped energy source
See 0386

Dual-Function Treatment for Nuclear Waste: Process prepares spent radioactive fuel for storage and extracts noble metals from it
See 0934

Landfill Gas Recovery: Existing and proposed methodologies for the recovery of methane from landfills are surveyed
See 0406

Modeling Landfill Methane Recovery: Two- and three-dimensional computer simulations are used for the analysis of gas recovery in landfills
See 0413

Removal and Recovery of Silver From Photographic and Photoreproduction Effluents
See 0427

Small Diameter Pumps for In Situ Leaching
See 0714

MATERIALS TESTS

Modified Oscillograph for Impacting Composite Materials: A commercial instrument is modified to impart energy in a realistic manner
See 0531

MATHEMATICAL MODELS

EPA Macroscopic Planning Model (EPAMAC) for Stormwater and Combined Sewer Overflow Control: Application Guide and User's Manual
See 0399

Flexible Method for Analyzing Bird Band Recovery Data
See 0858

Impact of Land-Based Biomass Production: Several models are evaluated
See 0914

Mathematical Model of Electrostatic Precipitation for the Texas Instruments Programmable 59 Calculator
See 0410

Model Developed To Simulate Dredged Material Movement
See 0412

Modeling Landfill Methane Recovery: Two- and three-dimensional computer simulations are used for the analysis of gas recovery in landfills
See 0413

Multivalued-Velocity-Field Model of Turbulence: The origin and propagation of vortexes are analyzed
See 0977

Numerical Models of Water Quality Conditions Are Developed
See 0419

Short-Rotation Forestry: Current state-of-the-art and future research topics are described
See 0931

Simulating Atmospheric Turbulence: Dimensionless time series for gusts and gradients have been calculated with a model
See 0037

Simulating Transportation and Storage in Coal Refining: Computer model analyzes hypothetical situations and highlights problems
See 0431

MEASURING INSTRUMENTS

Electronic Dilatometer: A nonclamping micrometer measures small strains
See 0479

Electronic Force Gage for Welders: Welding force is monitored in process
See 0480

Instrument is Developed to Measure Lead in Human Tibia
See 0500

New Portable Instrument Measures CO in Blood
See 0060

Reference Material Helps Manufacturers Evaluate Performance of Key Measuring Devices
See 0556

MEAT INDUSTRY

Energy Conservation in the Meat Industry: Ten case histories
See 0323

MECHANICAL ORGANS

Further Developments Made in Artificial Skin
See 0860

MEDICAL COMPUTER APPLICATIONS

Computer Analysis of Eye Blood-Vessel Images: Technique rapidly diagnoses diabetes mellitus
See 0043

Computer Model Has Been Developed To Assist Orthopedic Surgeons
See 0849

Computer Program Uses Fundamental Neuroanatomy as the Basis for Interpreting Patient Data
See 0850

Microcomputer Multiplexes Alphanumeric Labels on CRT's: External, low-power alphanumeric label generator eliminates costly video circuitry
See 0055

Microprocessor-Based Neural-Pulse-Wave Analyzer: Contributions from several nerve units are identified and separated
See 0056

New Monitor Allows Evaluation of Hyperactive Children
See 0059

Sharp-Focus Composite Microscope Imaging by Computer: Enhanced depth of focus aids medical analysis
See 0561

MEDICAL EQUIPMENT

Acoustic Tooth Cleaner: An acoustically-energized water jet aids in plaque breakdown
See 0038

Adjustable Walker for the Handicapped: The front legs adjust at the touch of a lever for use on stairs or ramps
See 0039

Device Developed to Treat Head and Neck Tumors
See 0044

FDA Testing Of Medical Devices
See 0048

Heart-Rate and Breath-Rate Monitor: Off-the-shelf components measure physiological rates to an accuracy of 1 pulse/minute
See 0049

Implanted Defibrillator Improves Survival Rate of Cardiac Patients
See 0051

Instrument is Developed for Ramp Injection of Radiotracers for Blood Flow Measurement by Emission Tomography
See 0052

Instrument is Developed to Measure Lead in Human Tibia
See 0500

Laser Treatment May Prevent Blindness for Some Victims of Histoplasmosis
See 0053

Lightweight, Economical Device Alleviates Drop Foot: Corrective apparatus alleviates difficulties in walking for victims of drop foot
See 0054

Microcomputer Multiplexes Alphanumeric Labels on CRT's: External, low-power alphanumeric label generator eliminates costly video circuitry
See 0055

Microprocessor-Based Neural-Pulse-Wave Analyzer: Contributions from several nerve units are identified and separated
See 0056

Microwave Spectrometer Developed
See 0057

New Monitor Allows Evaluation of Hyperactive Children
See 0059

New Portable Instrument Measures CO in Blood
See 0060

Portable Dental Chair Functions as a Total Care Unit
See 0881

Researchers Test Device to Aid Cardiac Patients
See 0063

Serological Detection of Antibodies to HTLV-III in Sera of Patients with AIDS and pre-AIDS Conditions
See 0885

Sharp-Focus Composite Microscope Imaging by Computer: Enhanced depth of focus aids medical analysis
See 0561

Transducer Joint for Kidney-Stone Ultrasonics: Improved mounting allows joint to last long enough for effective treatment
See 0065

Ultrasonic Transceiver Has Been Developed To Analyze Orthopedic and Neurological Problems
See 0066

Wheelchair Seat Suspension Has Been Developed
See 0068

MEMBRANES

Characterizing Shear Properties of Membranes: Shear stiffness is determined for use in vibration analysis
See 0755

Membrane Separation Overview Published
See 0112

Preventing Moisture Damage To Solar Panels: A proposed encapsulant would dissociate water into gas
See 0359

Self-Cleaning Tubular-Membrane Module: Cleaning proceeds continuously, without hindering processing
See 0825

METABOLISM

National Tritium Labeling Facility
See 0870

New Findings On the Metabolism of Copper Are Released
See 0872

METAL BENDING

Fabricating Slotted-Waveguide Arrays From Sheet Metal: Low-cost lightweight waveguides are formed from rolls of aluminum
See 0246

METAL COATINGS

Measuring Elastic Modulus of Sintered Metal: Technique minimizes the effect of the substrate on a thin sintered coating
See 0800

Metal Coating Multifilamentary Yarns: Process provides uniformly coated fibers for reinforcing high-temperature composites
See 0802

Reinforcement for Stretch Formed Sheet Metal: Metal reinforcement is flame-sprayed on the edges gripped in the stretch-forming setup
See 0695

METAL CUTTING

Machining Dovetails Efficiently: A cross-axial milling technique is fast and precise
See 0670

METAL FILMS

Thickness Gaging of Vapor-Deposited Metal Films: Phase-sensitive eddy-current instrument and microprocessor determine thicknesses with (25-nm) precision
See 0575

METAL FINISHING

Alternate Treatment of Organic Solvents and Sludges from Metal Finishing Operations
See 0380

METAL HALIDE LASERS

Controlling Metal-Halide Vapor Density in Lasers: Streams of buffer gas convect and dilute the metal-halide vapor
See 0961

Multiple-Wavelength Metal/Halide Laser: A single device produces multiple lasing lines
See 0976

METAL MATRIX COMPOSITES

Interface Reactions in Metal-Matrix Composites: An intermediate layer between fiber and matrix determines the mechanical properties of the composite
See 0792

Tensile Strengths of Alumina Fiber Composites: High correlation between experimental and theoretical results is obtained
See 0837

METAL OXIDE SEMICONDUCTORS

Determining the Point of Zero Zeta Potential in Solid Samples: In a new technique, the sample does not have to be in powder form
See 0467

Effects of Heavy-Charged Particles on MOS IC's: Although such particles are not troublesome now, they could be in the future
See 0237

METAL POWDER

Plated Metal Powders for Electrode Pastes: Metal grains to be sintered are precoated with frit metal
See 0682

METAL TUBING

Expander for Thin-Wall Tubing: A tool locally expands small-diameter tubes
See 0633

METAL WORKING

Intercritically Rolled Steels: Dynamic characteristics of these hard, fracture-resistant materials are presented
See 0791

Reinforcement for Stretch Formed Sheet Metal: Metal reinforcement is flame-sprayed on the edges gripped in the stretch-forming setup
See 0695

METALLIC GLASSES

Producing Metallic Glasses With Acoustic Levitation: Acoustic fields support and cool liquid particles
See 0814

METALLURGY

Acoustical-Levitation Chamber for Metallurgy: The sample can be moved to different positions for heating and quenching
See 0744

METALS

Standards For Toxic Metals In Human Urine Are Developed
See 0133

Studies Show Zinc Deficiency Retards Brain Development In Rats
See 0890

Vibrating Electrode System Improves Trace Element Detection
See 0140

METALS WITH A MEMORY

Shape-Memory Couplings for Emergency Repairs: Damaged hydraulic lines can be repaired to nearly new condition
See 0712

METEOR BURST COMMUNICATIONS

BURST - A Computer Program of a Meteor Burst Communications Model Used to Predict the Reliability of a Communications System That Uses Meteor Bursts as the Communications Channel
See 0177

METEOROLOGICAL DATA

Environmental Satellite Data and Information
See 0033

Environmental Satellite Data Made More Effective
See 0034

Processing and Enhancement of Weather Radar Data
See 0036

METHANE

Assessment of Landfill Methane Recovery: An assessment of the pros and cons and an annotated bibliography provide information on this untapped energy source
See 0386

Detecting Methane Leaks: A remote sensor uses laser radiation backscattered from natural targets
See 0462

Draining Methane From Coal Mines: Removing gas before coal is mined speeds up production
See 0904

Landfill Gas Recovery: Existing and proposed methodologies for the recovery of methane from landfills are surveyed
See 0406

Methane-Based Fuels for Automotive Fleet Vehicles: Publication shows how to exploit an alternative fuel for cars and trucks
See 1016

Modeling Landfill Methane Recovery: Two- and three-dimensional computer simulations are used for the analysis of gas recovery in landfills
See 0413

METHANE HYDRATES

Methane Hydrate - a Curiosity or a Vast Energy Resource: This icelike mixture may become a major source of natural gas
See 0356

METHANE/AMINO-HYDROXYMETHYL

Lead(203)-Tris-hydroxymethyl Aminomethane: A Radiopharmaceutical For Detection and Localization of Tumors
See 0865

METHYL ALCOHOL

Alcohol/Petroleum Fuels for Diesel Engines: Blends of methanol, ethanol, water, and diesel fuels were formulated and evaluated
See 0300

MICROCIRCUITS

Low-Cost Alternatives in Hybrid Microcircuit Packaging: Adhesive sealing, nickel plating, and multiwire boards are evaluated
See 0669

MICROCOMPUTERS

Connecting Separate Computers to a Common Bus: A network bus adapter handles protocols for computer-to-computer communications
See 0197

Extending the Memory of Microcomputers: Memory is increased while retaining real-time capabilities
See 0200

MICROELECTRONICS

Improved Electrostatic Optical System: The device is suitable for molecular epitaxial formation of semiconductor components
See 0653

Modernized Electronic Manufacturing Facility: Fabrication and testing capabilities are described
See 0272

New Program Will Analyze Microelectronic Test Data
See 0274

Reworking Packaged Hybrid Microelectronic Circuits: Equipment and processes have been developed for fast and economical delidding and resealing
See 0705

Standards for Epoxies Used in Microelectronics: Report has significant commercial applications
See 0832

MICROEMULSIONS

Diffusion Measurements in Microemulsions: Polarography yields the same value of diffusion coefficients as quasi-elastic light scattering (QLS)
See 0096

MICROFILM

Removing Images From Microfilm: The film is softened, scraped, and then dried
See 0953

MICROORGANISMS

Controlling Explosives With Microbes: A micro-organism removes nitrate ester groups from grains
See 0852

Suitcase-Sized Portable Microbiology and Clinical Laboratories Developed
See 0566

MICROPROCESSORS

Linking Smart Modules by a Single Channel: System architecture brings order to a potentially chaotic situation
See 0209

Microprocessor-Based Neural-Pulse-Wave Analyzer: Contributions from several nerve units are identified and separated
See 0056

Portable General Purpose Computer: Battery-operated, portable computer system features full computing capability on-site
See 0214

Programable Power Conditioner: It accepts a range of inputs and produces a range of outputs
See 0283

MICROSCOPES

Sharp-Focus Composite Microscope Imaging by Computer: Enhanced depth of focus aids medical analysis
See 0561

MICROSCOPY

Microscopy Opens New Frontier at Berkeley: Two electron microscopes reach unprecedented performance heights, one revealing atoms directly
See 0529

MICROWAVE ANTENNAS

Broadbeam Antenna-System Measurements Have Been Made Easier
See 0227

Decoupling a Reflecting Layer From Its Support Structure: Proposed mounting isolates the main support through intermediate flexural supports
See 0232

Low Loss Two-Signal Microwave Antenna Coupler
See 0265

MICROWAVE QUANTUM DETECTORS

Microwave Radiation Detector: A direct photon detector responds to microwave frequencies
See 0270

MICROWAVE SENSORS

Searching for Clear-Air Turbulence: An airborne microwave system would locate the tropopause to assist in the avoidance of clear-air turbulence
See 1019

MICROWAVE SPECTROMETERS

Microwave Spectrometer Developed
See 0057

MICROWAVE TUBES

An Electron Beam-Bunching Gun for RF Tubes: New electron-beam source provides for a new class of millimeter wave tubes
See 0240

MICROWAVES

Report Reviews Prediction Of Microwave Attenuation By Rainfall
See 0189

MILITARY TRAINING

Videodisc Technology Is Applied To Visual Display Systems
See 0954

MILLIMETER WAVES

Scientists Develop New Millimeter Wave Noise Standard
See 0559

MINE FIRES

Improved Fire Doors For Noncoal Underground Mines
See 0916

In-Mine Remote Actuated Stench Gas Warning System
See 0917

MINE ROOFS

Tester for Friction Rock Supports
See 0572

MINE SAFETY
Better Roof Bolter Dust Collector Maintenance Reduces Silica Dust Levels
See 0896
DC Switching System Rapidly Limits and Interrupts Fault Currents
See 0901
Headgate to Tailgate Cutting Lowers Longwall Shearer Operators' Dust Exposure
See 0912
Improved Fire Doors For Noncoal Underground Mines
See 0916
In-Mine Remote Actuated Stench Gas Warning System
See 0917
Instrumented Pick Detects Coal/Rock Interface: Strain-gage signals indicate whether coal or rock is being cut
See 0918

MINE VENTILATION
Scrubber in Blowing Section Offers Good Ventilation Taking 50 Foot Cuts
See 0930

MINES(EXCAVATIONS)
Design, Construction and Development of In Situ Mining Wells
See 0902
Guidelines For Accurate Mine Airflow Measurements
See 0911
Mechanical Coal-Face Fracturer: Radial points on a proposed drill bit would take advantage of the natural fracture planes of the coal
See 0919
Shuttle-Car System for Continuous Mining: Buffer storage catches the coal production between loadings
See 0932

MINING
How to Reduce Shearer Operators' Dust Exposure By Using Remote Control
See 0913
Reducing Longwall Face Workers' Respirable Dust Exposure From Roof Support Movement
See 0928

MINING EQUIPMENT
Better Roof Bolter Dust Collector Maintenance Reduces Silica Dust Levels
See 0896
Conveyor Belt Service Machine
See 0898
Flexible Roof Drill for Low Coal: A rod-changer drill system increases drill-bit life by 300 percent
See 0909
Headgate to Tailgate Cutting Lowers Longwall Shearer Operators' Dust Exposure
See 0912
Instrumented Pick Detects Coal/Rock Interface: Strain-gage signals indicate whether coal or rock is being cut
See 0918
Pressurized Slurry-Feed System: System avoids pumpage dilution and contact between pumps and abrasive liquids
See 0926
Quieted Hand-Held Percussion Drills
See 0927
Scrubber in Blowing Section Offers Good Ventilation Taking 50 Foot Cuts
See 0930

MIRRORS
Forming Mirrors on Composite Materials: Smooth coatings are deposited on hard-to-polish substrates
See 0969
Isolating Supports for X-Ray Mirrors: Simple concept reduces effects of gravity, temperature, and magnetism
See 0502
New Interferometer System Developed For Field Testing of Large Mirrors
See 0538
Normal-Incidence Soft-X-Ray Mirror: A multilayered interference structure has about 6 percent reflectivity
See 0540
Reproducible Mirror-Finish Metal Surfaces: Method produces highly reflective metal surfaces
See 0985
Torque Compensator for Mirror Mountings: Device nulls flexural distributions of pivotal torques
See 0735

MISSILES
New Device Simulates Realistic Vibration in Flight Vehicles
See 0535

MODELS
Non-linear Regression Program Developed
See 0211

MOISTURE CONTENT
Measuring Snow's Liquid Water Content
See 0522
Surface-Moisture Monitoring Technique: Technique would monitor the drying of continuous sheets of thin material
See 0721

MOISTURE METERS
Rain and Dew Detector: Moisture between fingerlike electrodes actuates a simple alarm circuit
See 0554

MOISTUREPROOFING
Reducing Housing Moisture Damage in Humid Climates
See 0079

MOLDING TECHNIQUES
Process for Molding Nonreinforced (Neat) Resins: Void-free moldings are obtained for neat, condensation, thermosetting resins
See 0813

MOLDS
CAD/CAM for Foundry Castings: High-quality steel-sand castings can be made quickly, inexpensively, and accurately
See 0598
Tool for Taking Clay Impressions: Profiles of parts are transferred for measurement
See 0731

MOLECULAR BEAM EPITAXY
Gallium Arsenide Waveguide for Light: Molecular-beam epitaxy creates a structure having controllable properties
See 0970

MOLECULAR BEAMS
Improved Electrostatic Optical System: The device is suitable for molecular epitaxial formation of semiconductor components
See 0653

MOLLUSCA
Aquaculture Methodology for Rearing Moluscs
See 0021

MOLTEN CARBONATE FUEL CELLS
Carbonate Fuel-Cell Cathode: Method for preparing porous cathode provides structural integrity and improved performance
See 0307

MONOCHROMATORS
Focusing X-Ray Monochromator for Synchrotron Radiation
See 0485

MOTHS
Gamma Rays Kill Moth Larvae on Fruit
See 0861

MOTION PICTURES
Automatic Control of Multimedia Shows: An audiovisual program is synchronized digitally
See 0948

MOTION SICKNESS
Biofeedback-Mediated Behavioral Treatment of Airsickness
See 0846

MOTOR TRUCKS
Performance of High-Mobility Wheeled Vehicles: They outperform conventional trucks on a wide variety of terrain
See 1017

MOUNTINGS
Decoupling a Reflecting Layer From Its Support Structure: Proposed mounting isolates the main support through intermediate flexural supports
See 0232
Edge Supports for Photovoltaic Modules: Mounting strips are patterned after glazing gaskets
See 0321
Shock Mounting for Heavy Machines: Elastomeric bearings eliminate extraneous forces
See 0713
Torque Compensator for Mirror Mountings: Device nulls flexural distributions of pivotal torques
See 0735

MULTIPLEXING
VHF Frequency-Hopping Multiplexer: Flexible design expands transceiver performance
See 0192

NAI DETECTORS
Hand-Held Field Spectrometer: Portable spectrometer employs microprocessor to provide extended analysis of radiation sources
See 0936

NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM
National Voluntary Laboratory Accreditation Program
See 0534
New Directory Of Accredited Laboratories
See 0536

NATURAL GAS
Data On Natural And Synthetic Gas Mixtures is Compiled
See 0316
Methane Hydrate - a Curiosity or a Vast Energy Resource: This icelike mixture may become a major source of natural gas
See 0356
Natural Gas Prospects in the Devonian Shales of the Eastern United States: Comprehensive study provides evaluation of natural gas resources in the Devonian Shale
See 0922

NAVIER-STOKES EQUATIONS
Flow Over Nonaxisymmetric Nozzles: Code solves three-dimensional Navier-Stokes equations
See 0966

NEAR FIELD
Near-Field Antenna Measurements Approximated
See 0273

NEGATIVE ION CHEMICAL IONIZATION MASS SPECTROSCOPY
Negative Ion Chemical Ionization Mass Spectroscopy (NICIMS) Successfully Detects Trace Compounds
See 0115

NEODYMIUM LASERS
System Measures Low-Level Laser Pulses
See 0569

NEOPLASMS
Device Developed to Treat Head and Neck Tumors
See 0044
Lead(203)-Tris-hydroxymethyl Aminomethane: A Radiopharmaceutical For Detection and Localization of Tumors
See 0865
Researchers Produce a Tumor Localizing Agent
See 0884
Spontaneous Changes in Chromosomes May Be First Detectable Event in The Onset of Tumorigenesis
See 0889

NERVOUS SYSTEM
New Tests for Gaucher's Disease Predict Nervous System Involvement
See 0875

NEUTRON SCATTERING
Neutron Scattering Is Used To Study Structures In Epoxies
See 0116

NICKEL
Predicting Sintered-Metal Resistivity From Porosity: An equation with one adjustable parameter fits the experimental data for nickel
See 0810
Reproducible Mirror-Finish Metal Surfaces: Method produces highly reflective metal surfaces
See 0985

NICKEL ALLOYS
Improving Oxide-Dispersion-Strengthened Alloys: Study examines ways to improve high-temperature performance and production techniques of NiCrAlY alloys
See 0789
Properties of Nickel/Titanium Wire and Tubing: Data on two useful forms of shape-memory alloy are presented
See 0815

NICKEL CADMIUM BATTERIES
Improved Nickel-Cell Electrode Material: An ozonation process gives higher capacity
See 0343

NICKEL IRON CELLS
Improved Nickel-Cell Electrode Material: An ozonation process gives higher capacity
See 0343

NIOBIUM ALLOYS
Oxidation-Resistant Columbium Nozzles: Investment casting and silicide coating are combined to yield strong heat-tolerant parts for gas turbines
See 0168

NITINOL
Properties of Nickel/Titanium Wire and Tubing: Data on two useful forms of shape-memory alloy are presented
See 0815

NITROGEN
Nitrogen Supply Uses Hydrazine: Liquid hydrazine is dissociated and residual gas removed to produce almost pure nitrogen
See 0120

NITROGEN FIXATION
Making Food From Sawdust
See 0027

NITROSAMINES
Formation of Nitrosamines Under Denitrification Conditions: Microbial denitrification systems may produce toxic, carcinogenic nitrosamines
See 0402

NOISE LEVELS
Predicting Aircraft Noise Levels: Program predicts noise levels from data on fan, combustor, turbine, and airframe sources
See 0017

NOISE REDUCTION
Controlling Industrial Noise: A handbook gives theoretical background and practical advice
See 0613
Noise Control in Propeller-Driven Aircraft: Double-wall sidewalls minimize interior noise and weight
See 0015
Quieted Hand-Held Percussion Drills
See 0927
Reducing Aircraft-Engine Noise: Shock structure is modified to eliminate the associated noise
See 0172

NOMOGRAMS
Simplified Procedures Have Been Developed for Calculating Chemical Doses for Water Stabilization
See 0430

NONDESTRUCTIVE TESTS
Acoustic-Emission Methods for Composite Materials: Techniques can be used for quality control and nondestructive evaluation
See 0448
Characterization Methods for Composite Reliability: Chemical, physical and mechanical tests are described
See 0751
Checking Weld Composition: Inconel 718 alloy welds are tested for the presence of filler metals
See 0602
Detecting Defective Solder Bonds: The method is noncontact and nondestructive
See 0618
Dielectric Scanning Locates Voids in Glass Foam: Capacitive probes may succeed where X-ray and ultrasonic equipment do not
See 0471
Eddy-Current Damage Test for Carbon Composites: A nondestructive test method detects cracks in materials of low conductivity
See 0475
Flash X-Ray Cineradiography: Framing rates up to 100,000 frames per second are possible to record fast events
See 0950
Holographic Interferometry for Large Structures: Whole vehicular components can be analyzed
See 0493
Inspecting Ingots and Preforms Prior to Hot Forging: Focused ultrasonic beams quickly and rapidly test steel ingots before rotary forging
See 0658
Magnetic Wire-Rope Tester: Rope interiors can be inspected nondestructively
See 0511
Measuring Tension in Transistor Suspensions: Vibration analysis is nondestructive and noninvasive
See 0525
Neutron Scattering Is Used To Study Structures In Epoxies
See 0116
Non-Destructive Inspection Technician Capabilities Are Improved
See 0016
Thermographic Testing of Composite Materials: Techniques and equipment are reviewed
See 0574
Ultrasonic Tube Tester: Probe provides complete scanning of tubular materials
See 0580
Wire Tester: Detects breaks, changes in cross section, and embedded foreign material
See 0586
X-Ray Detector for 1 to 30 keV: Array of deep silicon cells can be used for imaging or spectroscopy
See 0588
X-Ray-Diffraction Residual-Stress Analysis: Nondestructive method allows measurement of surface stresses in metal and ceramic materials
See 0591

NOZZLE FLOW
Flow Over Nonaxisymmetric Nozzles: Code solves three-dimensional Navier-Stokes equations
See 0966

NOZZLES
Evaporation Tower With Prill Nozzles: A tower could be more efficient than conventional evaporation equipment
See 0024

NUCLEAR FUELS
Measuring Nuclear Fuel Temperatures: Ultrasonic-thermometer system offers the most practicable alternative
See 0518
Resonance Ionization Mass Spectrometry
See 0131

NUCLEAR FUSION
Low Temperature Properties for Fusion Magnets Are Produced
See 0266
National Laser Users Facility: Experiments in High Energy-Density Physics
See 0938

NUCLEAR MAGNETIC RESONANCE
Measuring Additive Concentrations in Lubricating Oils: Nuclear magnetic resonance provides qualitative and quantitative information on key additives
See 0799

NUCLEAR POWER PLANTS
Evaluation of High-Efficiency Particulate Air Filters: Structural test results characterize ventilation filters for nuclear facilities
See 0632

NUCLEAR REACTOR ACCIDENTS
Coolant-Level Sensors for Nuclear Reactors: Proposed sensors detect the loss of coolant at an early stage of an accident
See 0460

NUMERICAL INTEGRATION
Obtaining Runge-Kutta Solutions Between Time Steps: A new interpolation method is used with existing Runge-Kutta algorithms
See 0980

NUTRITION
New Findings On the Metabolism of Copper Are Released
See 0872

NUTS(FRUITS)
Walnut Hulls Clean Aluminum: Hulls inflict minimal substrate damage
See 0840

OCCUPATIONAL SAFETY AND HEALTH
Longwall Coal Mine Respirable Dust Sources
See 0407
Occupational Health Information System Developed
See 0878
Occupational-Safety Workshops: Safety-management-control programs are offered
See 0879
Tiny Radiation Warning Devices: Miniature radiation warning device that enhances nuclear industry worker safety
See 0438

OCEAN SURFACE
Sea Surface Temperature Maps for Fishermen
See 0030

OCEAN TEMPERATURE
Sea Surface Temperature Maps for Fishermen
See 0030

OCEAN WAVES
Nearshore Sediment Transport Study, Torrey Pines Experiment
See 0943

OCEANOGRAPHIC DATA
The Ocean Pollution Data and Information Network (OPDIN)
See 0944

OFFROAD VEHICLES
Performance of High-Mobility Wheeled Vehicles: They outperform conventional trucks on a wide variety of terrain
See 1017

OIL RECOVERY
Extracting Oil From Tar Sands: Oil can be extracted using solar energy
See 0328

OIL SHALE
Combined Retort and Combustor for Oil Shale: Continuous fluidized-bed process extracts both fuel and heat
See 0312
Retort Utilizes Oil-Shale Fines: Additional energy is extracted, and waste disposal is simplified
See 0929

OIL SPILLS
Oily Sludges: A Physical Characterization
See 0421
Three New Techniques for Floating Pollutant Spill Control and Recovery
See 0436

OIL WELLS
Evaluation of Steam Generators for Oil Wells: Downhole steam generation appears to be effective, but corrosion is a problem
See 0908
Methods for Determining the Location of Abandoned Wells
See 0920

OPERATING COSTS
Planning Transport and Manufacturing for Lowest Cost: A method originally developed for spacecraft path-planning is also applicable to transportation and manufacturing
See 0680

OPTICAL COMMUNICATION
Bidirectional Fiber-Optic Cable Adapter: Two different wavelengths of light are transmitted in opposite directions on a single optical fiber
See 0956
Optical Coupler/Decoupler Communication Module: Design uses efficient, high-resolution-wavelength multiplexer
See 0186

OPTICAL CORRELATORS
Eliminating Doppler Effects in Synthetic-Aperture Radar Optical Processors: A pair of photodetectors generates correction signals
See 0243

OPTICAL COUPLING
Optical Coupler/Decoupler Communication Module: Design uses efficient, high-resolution-wavelength multiplexer
See 0186
Optical-Fiber-to-Channel-Waveguide Coupler: A holding device is made by etching V-shaped grooves in silicon
See 0275

OPTICAL DETECTION
Focal-Plane-Array Optical Proximity Sensors: Objects are detected at beam-axis intersections
See 0640
Two-Slit Optical Particle-Measuring System: Sizes and velocities are quickly estimated
See 0578

OPTICAL FILTERS
Multiple-Image Holographic Matched Filter: New technique for making holograms greatly increases storage density
See 0975

OPTICAL LENSES
Beam Splitter Introduces Little Aberration: Placing a beam splitter inside an existing lens minimizes aberrations
See 0955
Secondary-Spectrum-Free Lens System: Inclusion of a calcium fluoride element allows all aberrations to be reduced to insignificant levels
See 0987

OPTICAL PUMPING
Pulsed Gas Laser-Pumping System: Higher laser efficiencies are obtained
See 0983

OPTICAL SCANNERS
Measuring Diffusion and Recombination in Polycrystalline Silicon: Light-beam-induced currents yield information about solar-cell material
See 0354

OPTICAL TESTS
New Interferometer System Developed For Field Testing of Large Mirrors
See 0538
Precise Measurement of Effective Focal Length: Computerized instrument measures effective focal lengths to 0.01 percent accuracy
See 0549
Submillisecond Optical Knife-Edge Testing: Data are sampled much faster than the optical system drift rate
See 0565
Vibration-Isolation Bench for Testing in Vacuum: Precise optical systems can be tested without contamination
See 0584

OPTICAL WAVEGUIDES
Gallium Arsenide Waveguide for Light: Molecular-beam epitaxy creates a structure having controllable properties
See 0970
Polymer Bonding of Optical Fibers: Optical waveguides are coupled through their sides
See 0982

ORGANIC COMPOUNDS
Development of a Continuous Monitor for Detection of Toxic Organic Compounds
See 0469
Optimization of Liquid-Liquid Extraction Methods for Analysis of Organics in Water
See 0121
Petroleum Crude Oil Reference Material Available
See 0124

ORGANIC SOLVENTS
Alternate Treatment of Organic Solvents and Sludges from Metal Finishing Operations
See 0380

ORGANOGENESIS
Computer Simulates Organogenesis
See 0851

OSCILLATORS
Stable Resonators for Temperature-Compensated Oscillators: SC-cut crystals offer superior stability with less sensitivity to cutting error
See 0293

OXIDATION
Wet Oxidation and Ozonation of Specific Organic Pollutants
See 0445

OXYGEN
Improved O2/H2 Gas-Mixture Sensor: Monitor of mixture concentration uses a catalyzed and an uncatalyzed temperature probe
See 0496

OZONIZATION
Improved Nickel-Cell Electrode Material: An ozonation process gives higher capacity
See 0343
Wet Oxidation and Ozonation of Specific Organic Pollutants
See 0445

PACKAGING
Fire Retardants in Packaging: Wooden boxes and fiber containers for ammunition storage are treated with fire retardant to eliminate spread of fire
See 0779
Low-Cost Alternatives in Hybrid Microcircuit Packaging: Adhesive sealing, nickel plating, and multiwire boards are evaluated
See 0669
Reworking Packaged Hybrid Microelectronic Circuits: Equipment and processes have been developed for fast and economical delidding and resealing
See 0705

PANELS
Curved Caps Raise Corrugation Strength: Construction concept would increase the strength-to-weight ratio of corrugated panels
See 0143
Designing Glass Panels for Economy and Reliability: Method considers such factors as glass temper and load duration
See 0767
Fire-Resistant Composites: A resin blend produces high-char-yield, low-smoke composites
See 0780
J-Channel Locks Potting to Compression Panel: Panel ends are supported to prevent edge failure during testing
See 0503
Retaining Ring Fastener for Solar Panels: A collapsible linkage enables rapid installation and removal of panels
See 0701
Steel Grating Cage Provides Secure Enclosure
See 0158

PAPER INDUSTRY
Monitoring Lignin Content in Paper Processing: Feedstock and finished pulp can be analyzed and controlled automatically
See 0114

PARACHUTES
New Parachute Controls Rotation
See 0014

PARASITES
Parasite Specimens Available
See 0880

PARTICLE SIZE DISTRIBUTION
Two-Slit Optical Particle-Measuring System: Sizes and velocities are quickly estimated
See 0578

PARTICLES
Analysis of Polynuclear Aromatic Hydrocarbons in Particulate Matter by Luminescence Techniques
See 0381
Diesel Particulate Destruction: A pulsed electrical discharge eliminates particulates in diesel exhaust
See 0392
Electroplating Small Particles: Particles are kept in motion near the cathode while they are plated
See 0629
An Instrument for the Investigation of Particle Fluxes in Marine and Fresh Waters
See 0499
Ultrasonics and Optics Would Control Shot Size: Uniformly-sized silicon shot would be produced by a proposed feedback system
See 0738

PASSIVE HEATING
Water Panels for Passive Heating: Tankwall sections absorb solar energy with little reradiation to the outside
See 0083

PASSIVE SOLAR HEATING
Instrumentation for an Energy-Conserving House: Sensors, data logging, and data processing are described
See 0075

PATH OF POLLUTANTS
Air Land Water Analysis System (ALWAS): A Multi-Media Model for Toxic Substances
See 0379

PATHOLOGY
Tissue Specimens Available for Pathology Studies
See 0891

PATTERN RECOGNITION
Multiple-Image Holographic Matched Filter: New technique for making holograms greatly increases storage density
See 0975

PAVEMENTS
Low Cost Bridge Deck Surface Treatment
See 0149
Spray Machine For Applying A Polymer Resin Overlay To Road Surfaces
See 0157

PDU PROCESS
A Modular Transportable Process Development Unit For Wastewater Treatment Polishing Studies
See 0414

PEAT
Dewatering Peat With Activated Carbon: A proposed process should produce enough gas and carbon to sustain itself
See 0319

PECTINS
Gelled Anti-icing Agents: A gelling agent such as pectin is added to an antifreeze/water mixture
See 0099

PERMANENT MAGNETS
Rare Earth/Cobalt Permanent Magnets: Magnets allow significant simplifications in circuit design
See 0285
Samarium Alloys for Permanent Magnets: These materials offer the potential for high-performance, lightweight magnets for electronic devices
See 0823

PEST CONTROL
Gamma Rays Kill Moth Larvae on Fruit
See 0861
Jamming Courtship Signals with Scent Molecules May Curb Insect Pest
See 0026

PESTICIDES
Bromination Process for Disposal of Spilled Hazardous Materials
See 0387

PETROLEUM PRODUCTS
Colloidal Liquid Fuel: Heavy petroleum fractions are extended with coal particles to form a pumpable fuel
See 0311
Enthalpy of Coal Fluids: Thermodynamic model aids in simulation of synthetic fuel processes
See 0098

PHASE SHIFT
Stabilizing Fiber-Optic Transmission Lines: A voltage-controlled optical phase shifter is the key
See 0292

PHASE SHIFT CIRCUITS
Digital Phase-Shift Standard: Circuit using just three IC's could be used to perform precise calibration
See 0472

PHASE TRANSFORMATIONS
Electrical Dissipation Measurement of Polymer Phase Transitions: The change in dipole packing occurring with each transition is sensed by its effect on the dissipation factor
See 0097

PHENOLIC RESINS
Process for Molding Nonreinforced (Neat) Resins: Void-free moldings are obtained for neat, condensation, thermosetting resins
See 0813

PHENYLKETONURIA
NICHD-Supported Scientists Design Test for Prenatal Diagnosis of PKU
See 0877

PHEROMONES
Jamming Courtship Signals with Scent Molecules May Curb Insect Pest
See 0026

PHOTOACOUSTIC SPECTROSCOPY
Photoacoustic Spectroscopy of Chemical Reactions: Technique yields information on polymerization and electrochemical reactions
See 0125

PHOTOGRAPHIC FILM
Photographic Film Tested on Space Shuttle Flights
See 1005
Preserving Color in Developed Photographic Film: Sealed storage container has moist nonoxidizing atmosphere to retard fading
See 0952

PHOTOGRAPHIC TECHNIQUES
Photographic Film Tested on Space Shuttle Flights
See 1005

PHOTOGRAPHY
Automated Plankton Sorting System
See 0844
Removal and Recovery of Silver From Photographic and Photoreproduction Effluents
See 0427

PHOTOLUMINESCENCE
Tritium Radioluminescent Lighting Developed for Remote Sites
See 1021

PHOTOMASKING
Fine-Line Pattern Processing for Photoresist Films: High resolution is obtained in 25-micro m thick resists
See 0637

PHOTOMETERS
Bacteria Count Photometer is Developed
See 0999

PHOTOMICROGRAPHY
Sharp-Focus Composite Microscope Imaging by Computer: Enhanced depth of focus aids medical analysis
See 0561

PHOTOVOLTAIC CELLS
Detecting Solar-Cell Failures: Circuit identifies a malfunctioning photovoltaic array
See 0317
Detecting Solar-Cell Failures: Circuit identifies a malfunctioning photovoltaic array
See 0463
Developing Standards for Photovoltaic Devices: Ground rules are outlined for evaluating photovoltaic technology
See 0318
Developing Standards for Photovoltaic Devices: Ground rules are outlined for evaluating photovoltaic technology
See 0468
Effects of Outdoor Soiling on Photovoltaic Modules: Airborne contaminants degrade module performances
See 0322

PHOTOVOLTAIC POWER SUPPLIES
Costs of Batteries for Photovoltaic Power Systems: Installed and life-cycle costs for several technologies and applications are evaluated
See 0315
Load Management for Residential Photovoltaic Systems: A simulation of a utility-connected photovoltaic system shows that onsite utilization of photovoltaic-generated electricity is decoupled from system value at reasonable buyback rates
See 0351
Portable Data Logger for Photovoltaic Panels: Instrument measures rapidly changing knee of V-I curve with extra care
See 0545
Two-Stage Off-Axis Cylindrical Solar Concentrator: The reflector for a photovoltaic power supply uses off-axis geometry for efficient uniform illumination
See 0374

PICOSECOND PULSES
Broadly Tunable Picosecond IR Source: Source produces continuously tunable, high-power radiation in the 10- to 20-micro m band
See 0958

PIEZOELECTRIC MATERIALS
Glass Ceramics, Shape Memory, and Ferroelectric Materials: Report presents three results from materials studies
See 0784

PINS
Measuring Locomotive Drawbar Pull: A coupler pin becomes an accurate and rugged force sensor
See 0517
Measuring Recessed Pins: A sleeve-and-rod-tool measures distances in blind locations
See 0519

PIPE FLOW
Swirl Diffuser: A gas diffuser, based on swirling flow, dissipates the incoming gas velocity in a relatively short distance
See 0993

PIPELINE TRANSPORTATION
Coaxial Pipe for Liquid Natural Gas: System provides ultrareliable protection against leaks
See 0604

PIPELINES
A Guidance Has Been Developed To Evaluate Existing Water Distribution Systems
See 0147
Measuring Slurry Flow: Noncontact ultrasonic instrument is accurate and versatile
See 0520

PIPES(TUBES)
Corrosion-Prevention for Steel Stovepipes: Several materials were found to extend the service life significantly
See 0759
Material Handling Systems for Large Tubes: Handling time can be cut in half
See 0673
Ultrasonic Tube Tester: Probe provides complete scanning of tubular materials
See 0580

PIPING SYSTEMS
Coaxial Pipe for Liquid Natural Gas: System provides ultrareliable protection against leaks
See 0604

PLANAR DEVICES
Planar-Doped Barrier Semiconductors: New classes of electronic devices are being evolved
See 0277

PLANETARY GEARS
Reliability Model for Planetary Gear Trains: A probabilistic model provides a realistic estimate of life expectancy
See 0696

PLANKTON
Automated Plankton Sorting System
See 0844

PLANT GROWTH
Standardized Procedures for Planting Vegetation on Completed Sanitary Landfills
See 0433
Tool For Rangeland Management and Research Is Developed
See 0032

PLANTS(BOTANY)
Detection of Carcinogenicity Based on Mutagenicity in Arabidopsis
See 0854
Wastewater Treatment with Plants in Nutrient Films
See 0444

PLASMA ARC TESTING
Dissociated Airflow Effects During Plasma-Arc Testing: Program computes heating rates and surface-friction effects
See 0008

PLASMA JETS
Dissociated Airflow Effects During Plasma-Arc Testing: Program computes heating rates and surface-friction effects
See 0008

PLASMA RADIATION
Plasma Treatment of High-Strength Fibers: Continuous process yields large quantities of wettable fibers for lamination
See 0808

PLASMA SPRAYING
Manufacturing Small Thermionic Devices: Circuit layers would be deposited by dc-plasma spraying
See 0267

PLASMAS(PHYSICS)
Improved Coil for Hydrogen Dissociators: The flat coil has a rigid printed-circuit substrate
See 0971
National Laser Users Facility: Experiments in High Energy-Density Physics
See 0938

PLASTIC COATINGS
Forming Mirrors on Composite Materials: Smooth coatings are deposited on hard-to-polish substrates
See 0969

PLASTIC SPHERES
Increasing Fluid Compressibility With Plastic Spheres: Suitability of various sphere materials is evaluated
See 0790

PLASTICIZERS
New Superplasticizers Are Being Used In Concrete
See 0151

PLASTICS
Characterizing Shear Properties of Membranes: Shear stiffness is determined for use in vibration analysis
See 0755
Nonliquid Process Prepares Plastics for Electroplating: Gaseous-phase preparation is much simpler than conventional liquid-phase preparation
See 0806
Properties of Wet Kevlar/Epoxy Composites: Wet and dry materials are compared and reasons for differences are explored
See 0816
Selection Factors for Plastics: General guidelines and specific examples are presented
See 0824
Solvent-Resistant Polysulfones: Polysulfones terminated with trimethylsilylethynyl, ethynyl, and phenylethynyl groups have increased solvent resistance
See 0831

PLASTICS INDUSTRY
Reducing Energy Costs in the Plastics Industry: A variety of simple, fast-payback methods are suggested
See 0364

PLATING
Electroplating Small Particles: Particles are kept in motion near the cathode while they are plated
See 0629
High-Density Printed Wiring: Channel plating provides thin, closely spaced conductors
See 0252
Plating Process to Improve Use of Chromium Has Been Developed
See 0683
Portable Plating System: A 30-gallon system is transported on a mobile cart
See 0685
Pulsed Electrodeposition of Alloys: Chemical composition versus thickness profile of plated alloys improved using pulsed plating
See 0817
Treatment of Plating Wastewater: A survey of treatment practices shows need for uniformity and improvements
See 0440

POLARIZATION(WAVES)
X-Ray Diffraction Polarization: Polarization ratios are key factors in applying X-ray diffraction methods for accurate analysis of materials
See 0589

POLAROGRAPHY
Diffusion Measurements in Microemulsions: Polarography yields the same value of diffusion coefficients as quasi-elastic light scattering (QLS)
See 0096

POLYCHLORINATED BIPHENYLS
Removing PCB's From Oils: Contaminated oil can be cleansed and recycled, and the PCB's disposed of in the prescribed manner
See 0428
Safe Disposal of PCB Waste: A variety of disposal technologies are assessed
See 0429

POLYIMIDE RESINS
Aromatic Polyimides With Group VI Linkages: Thermally-stable, solvent-resistant polyimides are readily processable by hot-melt techniques
See 0088
Process for Molding Nonreinforced (Neat) Resins: Void-free moldings are obtained for neat, condensation, thermosetting resins
See 0813

POLYMERIC CONCRETE
Epoxy Grout With Silica Thickener: Grout cures quickly, even in the presence of hydraulic oil
See 0773

POLYMERIC FILMS
Characterizing Shear Properties of Membranes: Shear stiffness is determined for use in vibration analysis
See 0755
Moisture-Transmitting Polymers: The vapor transmissivity and physical properties of hydrophilic polyurethane films qualify them for a variety of applications
See 0113

POLYMERIZATION
Accelerated Curing of Epoxy Resins: Trisubstituted urea/epoxy mixture generates amine that lowers the curing temperature
See 0084
Accelerating Epoxy-Resin Curing: Trisubstituted ureas simplify the curing process and speed it up
See 0085
Aromatic Polyimides With Group VI Linkages: Thermally-stable, solvent-resistant polyimides are readily processable by hot-melt techniques
See 0088
Perfluoroalkylene-Ether Triazine Elastomers: New process yields a product that resists heat and the action of oxygen and water
See 0123
Photoacoustic Spectroscopy of Chemical Reactions: Technique yields information on polymerization and electrochemical reactions
See 0125
Polycarbosilazane-Resin Polymerization Process: Process is suitable for production of silicon nitride/silicon carbide fibers
See 0126

POLYMERS
Cracks in Glass Polymers Induced by Solvent Absorption: The combination of soluble particles and absorbed solvents cause polymer cracking
See 0763
Electrical Dissipation Measurement of Polymer Phase Transitions: The change in dipole packing occurring with each transition is sensed by its effect on the dissipation factor
See 0097
Polymeric Applications in Electronics: A training manual shows how to use polymeric materials in fabricating electronic components
See 0809
Spray Machine For Applying A Polymer Resin Overlay To Road Surfaces
See 0157

POLYSULFONES
Solvent-Resistant Polysulfones: Polysulfones terminated with trimethylsilylethynyl, ethynyl, and phenylethynyl groups have increased solvent resistance
See 0831

POLYURETHANE RESINS
Moisture-Transmitting Polymers: The vapor transmissivity and physical properties of hydrophilic polyurethane films qualify them for a variety of applications
See 0113

PORTABLE EQUIPMENT
Portable Dental Chair Functions as a Total Care Unit
See 0881
Suitcase-Sized Portable Microbiology and Clinical Laboratories Developed
See 0566

PORTLAND CEMENTS
Epoxy Grout With Silica Thickener: Grout cures quickly, even in the presence of hydraulic oil
See 0773

POSITION INDICATORS
Angular Measurements in Gimbal-Mounted Sensors: Fiberoptic lightguide pickoff has good signal resolution and accuracy without disadvantages of mechanical inertial-guidance systems
See 0450

POSITIONING DEVICES(MACHINERY)
Air-Lubricated Lead Screw: Submicrometer accuracy is anticipated
See 0593
Coil-Welding Aid: A positioner holds a coil inside a cylinder during tack welding
See 0606
Holding Tubes in Place for Brazing: Simple method prevents loosening due to thermal mismatch
See 0649
Portable Pallet-Weighing Apparatus: Weighing is safer and more convenient
See 0546

POSITION(LOCATION)
Focal-Plane-Array Optical Proximity Sensors: Objects are detected at beam-axis intersections
See 0640

POTABLE WATER
Simplified Procedures Have Been Developed for Calculating Chemical Doses for Water Stabilization
See 0430

POTTING COMPOUNDS
Removable Foam Encapsulants: Thermoplastic potting compound can be dissolved when necessary
See 0819

POWDER METALLURGY
Rapid Solidification Processing Research Atomizer Constructed
See 0555

POWER FACTOR
Digital Single-Phase Power-Factor Controller: Digital circuit has faster response to load changes
See 0234

POWER LINES
Superefficient VAR Controller: A superconducting coil controls reactive power with minimal loss
See 0295
Superefficient VAR Controller: A superconducting coil controls reactive power with minimal loss
See 0370

POWER MEASUREMENT
Measuring Power Flow in Electric Vehicles: Instrument accommodates switching transients and common-mode voltages
See 1015
System Measures Low-Level Laser Pulses
See 0569

POWER SUPPLIES
Plastic-Sealed Hybrid Power-Circuit Package: Concept uses a plastic hermetically sealed package
See 0278

POWER SUPPLY CIRCUITS
Improved High-Current Drive Circuit: It uses a VMOS field-effect power transistor
See 0258
Programable Power Conditioner: It accepts a range of inputs and produces a range of outputs
See 0283

PRESSURE REGULATORS
Pressure Reducer for Coal Gasifiers: Multistage device resists the action of hard particles entrained in gas
See 0128

Pressure Reducing Valve (PRV) To Measure Steam Quality
See 0687

Spool-Valve Pressure-Difference Regulator: Valves maintain a preset pressure difference between gas flows
See 0719

PRESSURE SENSORS

Electronically-Scanned Pressure Sensors: Sensors do not have to be pneumatically switched
See 0481

PRESSURE VESSELS

Fatigue Strength of Pressurized Cylinders: Prestressing is found to improve fatigue resistance
See 0636

Pressurized Slurry-Feed System: System avoids pumpage dilution and contact between pumps and abrasive liquids
See 0926

PREVENTIVE MEDICINE

Biochemical Markers Useful in Preventing Cancer and Cardiovascular Disease Developed
See 0845

PRIMATES

Special Primate Specimens Are Now Available
See 0888

PRINTED CIRCUIT BOARDS

Probe Array for Testing Printed-Circuit Substrates: Spurious conduction paths are found by an array of miniature test probes
See 0688

PRINTED CIRCUITS

Fire-Resistant Composites: A resin blend produces high-char-yield, low-smoke composites
See 0780

High-Density Printed Wiring: Channel plating provides thin, closely spaced conductors
See 0252

Improved Coil for Hydrogen Dissociators: The flat coil has a rigid printed-circuit substrate
See 0971

Modernized Electronic Manufacturing Facility: Fabrication and testing capabilities are described
See 0272

Printed Circuit Converts RF Energy to dc Power: An ultra-light-weight, large-area, antenna/rectifier has 85 percent conversion efficiency
See 0281

Rapid Circuit Breadboarding: The cost of a one-of-a-kind circuit board would be reduced
See 0284

PROBES

On-Site Assaying of Uranium Ore: Borehole probe produces and measures the radioactivity of in-place earth samples
See 0924

PROCESS CHARTING

Automatic Flowsheet Layout: Software package provides instructions for an automatic drawing machine
See 0193

PROCESS CONTROL

Computer Models for VLSI Fabrication Processes: A completely new, advanced computer program is now available
See 0608

Computer-Controlled Laser Welding: Limited access joints in a gas-turbine recuperator are welded using a moving-mirror, computer-controlled CO2 laser
See 0609

Gas-Jet Meniscus Control in Ribbon Growth: Analysis finds jet parameters to control thickness of ribbon pulled vertically from melt
See 0643

Tandem Production Operations: Two methods are developed for selecting the capacity of a buffer between two asynchronous production operations
See 0722

Ultrasonics and Optics Would Control Shot Size: Uniformly-sized silicon shot would be produced by a proposed feedback system
See 0738

PROCESS HEAT

Low-Temperature Solar-Energy Systems: High efficiency is possible for industrial applications
See 0353

Solar Energy for Industrial Processes: Thermal systems could provide heat-delivery rates of 2.8 to 3.4 GJ/yr/sq m at a cost of $50/GJ/yr
See 0715

PROCUREMENT

Buyer's and User's Guide to Flexible Manufacturing Systems: Detailed advice is offered on acquiring a system, installing it, and operating it
See 0597

Requesting and Preparing Proposals: Samples provide guidance on form and content
See 0700

PRODUCT INSPECTION

Analytical Methods for Synfuel Production: Techniques sometimes produce differing results from laboratory-to-laboratory
See 0087

Checking Surface Contours: Rubber impressions are viewed with an optical comparator
See 0601

Improving Trace-Ion Sensitivity: Background noise is reduced by some special precautions
See 0656

Inspecting Ingots and Preforms Prior to Hot Forging: Focused ultrasonic beams quickly and rapidly test steel ingots before rotary forging
See 0658

Measuring Tension in Transistor Suspensions: Vibration analysis is nondestructive and noninvasive
See 0525

Probe Array for Testing Printed-Circuit Substrates: Spurious conduction paths are found by an array of miniature test probes
See 0688

Quality-Planning-Requirements Document: Report describes orderly methods for planning quality-assurance inspection procedures
See 0692

Surface-Moisture Monitoring Technique: Technique would monitor the drying of continuous sheets of thin material
See 0721

Universal Pin Electronics Tester: Improved performance and reliability are obtained at reduced cost
See 0582

PRODUCTION CONTROL

Flexible Manufacturing Systems: Strategies for improving productivity with computers are presented
See 0639

Tandem Production Operations: Two methods are developed for selecting the capacity of a buffer between two asynchronous production operations
See 0722

PRODUCTION MANAGEMENT

Distributed Data Processing in Manufacturing: Departmental minicomputers connected to a large host computer can increase productivity
See 0620

Production Cost Estimating: Interactive model combines learning-curve techniques with adjusted-unit cost methods
See 0689

PROJECT MANAGEMENT

Configuration Analysis Tool: An interactive program for storing information and generating reports on project configuration management
See 0196

PROSTHETIC DEVICES

Cochlear Implants May Allow Some Deaf People To Hear
See 0042

PROTECTIVE CLOTHING

Adhesive Removal From Protective Clothing: An electric eraser removes butyl cement from protective coveralls
See 0745

Effectiveness of Cooling Garments: Water-cooled vests with portable heat exchangers are evaluated
See 0046

Evaluation Tests for Cold-Weather Clothing: Performance and durability are measured
See 0047

PROTECTIVE COATINGS

Coating for Carrier Decks Improved
See 0004

New Visual Aids Developed For Operational Pilots
See 0061

Plating Process to Improve Use of Chromium Has Been Developed
See 0683

Rhenium Prevents Corrosion: Thrust chamber is protected from corrosive fuel during burns
See 0821

PROTECTORS

Transporter for Treated Sheet Materials: Plastic spacers keep parts separated during transport or storage
See 1020

PROTON DENSITY

Charged-Particle Flux Sensor: Improved design has greater collection efficiency
See 0456

PROTOZOA

Parasite Specimens Available
See 0880

PUBLIC HEALTH

Guidelines for Monitoring Indoor Air Quality
See 0403

PULPING

Oil Recovery Enhancement With Paper Pulp Wastes
See 0420

PULSE COMMUNICATION

Coding for Single-Line Transmission: Scheme for code generation and conversion has only modest equipment requirements
See 0178

Evaluation of the Comprehension of Non-Continuous, Sped-Up Vocoded Speech: A strategy for coping with fading HF (high frequency) channels
See 0180

PULSE GENERATORS

Flat Pulse Generator Developed
See 0248

Method Has Been Developed to Remove Effects of Time Jitter
See 0528

PUMPS

Cryogenic Vacuum Pump: System provides high pumping capacity, even for noble gases
See 0615

Estimating Pump Blockage: Blockage can be predicted for all components, including inducers, impellers, and diffusers
See 0631

Jet Engines as High-Capacity Vacuum Pumps: A large diffuser operational envelope and long run times are possible
See 0165

Pumps as Turbines: Low cost and immediate availability are the prime advantages of pumps operated as turbines
See 0690

Small Diameter Pumps for In Situ Leaching
See 0714

PURIFICATION

Fuel-Cell Reactant-Gas Purifier: A catalytic purifier removes oxygen from hydrogen feedlines just upstream of a fuel-cell stack
See 0332

PYRHELIOMETERS

Pyrheliometer With Improved Accuracy, Instrument maintains components at constant temperature and allows tenfold improvement in instrumental accuracy
See 0553

PYROELECTRICITY

Glass Ceramics, Shape Memory, and Ferroelectric Materials: Report presents three results from materials studies
See 0784

PYROLYSIS

Combined Silane Pyrolysis and Silicon-Particle Melt: Melter directly coupled to pyrolyzer would eliminate difficulties of transport
See 0093

PYROTECHNICS

Air Pyrotechnic Signals Are Tested
See 0449

QUALITY ASSURANCE

Integrated Computer Aided Manufacturing (ICAM) Quality Assurance Modeling and Analysis Assures Quality Products
See 0660

QUALITY CONTROL

Analytical Methods for Glass-Fiber-Reinforced Composites: Techniques for quality control are reviewed
See 0746

Checking Surface Contours: Rubber impressions are viewed with an optical comparator
See 0601

Economic Model Assesses Benefits of Improved Test Accuracy
See 0623

Improving Flat-Cable Manufacturing: Cable rejection rate is reduced by almost half
See 0260

Improving Trace-Ion Sensitivity: Background noise is reduced by some special precautions
See 0656

Probe Array for Testing Printed-Circuit Substrates: Spurious conduction paths are found by an array of miniature test probes
See 0688

Pull Test Verifies Gap Loading: The force necessary to initiate movement of a thin plastic strip is a measure of the gap tightness
See 0552

Quality Improvement of Frozen Widow Rockfish Products
See 0029

Quality-Planning-Requirements Document: Report describes orderly methods for planning quality-assurance inspection procedures
See 0692

Reference Material Helps Manufacturers Evaluate Performance of Key Measuring Devices
See 0556

QUARTZ

Manufacturing Surface-Acoustic-Wave Devices: Work on an early phase of manufacturing development is described
See 0268

RADAR

Digital SAR Processor: It produces real-time, single-look, high-resolution imagery
See 0233

Eliminating Doppler Effects in Synthetic-Aperture Radar Optical Processors: A pair of photodetectors generates correction signals
See 0243

Improved Coal-Thickness Measurement: Summed signals and a dielectric-filled antenna improve the measurement
See 0915

Processing of Synthetic-Aperture-Radar Data: Ambiguous data are combined to permit fast-transform convolution
See 0282

Radar for Mapping Sea Ice: X-band system would have 100 sq m resolution
See 0946

RADIATION DAMAGE

Accelerated Solar-UV Test Chamber: Medium-pressure mercury-vapor lamps provide a high ratio of ultraviolet to total power
See 0446

RADIATION DOSAGE

Liquid Pathway Dose Calculations (LADTAP2)
See 0866

Multiple-Compartment Dosimeter: Radiation dose is measured at various depths
See 0869

Optical-Fiber Dosimeter: Portion of red-to-blue light spectrum transmitted indicates radiation dose
See 0543

Tiny Radiation Warning Devices: Miniature radiation warning device that enhances nuclear industry worker safety
See 0438

RADIATION EFFECTS

Effect of Cosmic Rays on MSI Devices: Low-power logic devices are susceptible to cosmic-ray particles
See 0236

Effects of Heavy-Charged Particles on MOS IC's: Although such particles are not troublesome now, they could be in the future
See 0237

Food Irradiation Expertise is Developed
See 0859

Microwave Spectrometer Developed
See 0057

Radiation Improves Materials Bonding: Bonds with fluorocarbons are made without surface preparation
See 0818

RADIATION MEASURING INSTRUMENTS

Hand-Held Field Spectrometer: Portable spectrometer employs microprocessor to provide extended analysis of radiation sources
See 0936

On-Site Assaying of Uranium Ore: Borehole probe produces and measures the radioactivity of in-place earth samples
See 0924

A Portable Radiation Monitor: Battery-operated monitor detects and identifies radiation on site
See 0547

Viewer Makes Radioactivity Visible: A battery-operated viewer could aid in contamination surveys and medical diagnoses
See 0585

Wristwatch Dosimeter: Besides telling the time, a device indicates radiation dosage and dosage rate
See 0587

X-Ray Detector for 1 to 30 keV: Array of deep silicon cells can be used for imaging or spectroscopy
See 0588

RADIO FREQUENCIES

Microwave Radiation Detector: A direct photon detector responds to microwave frequencies
See 0270

RADIO RECEIVERS

Receiver for Antenna Arrays: A scheme to obtain an amplified, demodulated output
See 0188

RADIO RECEPTION

Frequency-Diversity Reception for Phase Modulation: Signal-to-noise ratio would be improved
See 0183

Radio-Frequency and Wideband Modulation Arraying: The summing network receives coherent signals from all the receivers in an array
See 0187

RADIO TRANSMISSION

BURST - A Computer Program of a Meteor Burst Communications Model Used to Predict the Reliability of a Communications System That Uses Meteor Bursts as the Communications Channel
See 0177

Report Reviews Prediction Of Microwave Attenuation By Rainfall
See 0189

VHF Frequency-Hopping Multiplexer: Flexible design expands transceiver performance
See 0192

RADIOACTIVE WASTE STORAGE

Dual-Function Treatment for Nuclear Waste: Process prepares spent radioactive fuel for storage and extracts noble metals from it
See 0934

RADIOACTIVE WASTES

Dual-Function Treatment for Nuclear Waste: Process prepares spent radioactive fuel for storage and extracts noble metals from it
See 0934

Interim Radioactive-Waste Storage: A relatively inexpensive method produces high-level radioactive wastes for transport and temporary storage
See 0937

Packaging Nuclear and Chemical Waste for Disposal: Waste would be encapsulated in hollow silicon spheres
See 0422

A Portable Radiation Monitor: Battery-operated monitor detects and identifies radiation on site
See 0547

Survivability of Nuclear-Waste Casks: Test program simulated railroad accidents to evaluate the safety of these casks
See 0568

RADIOGRAPHY

Flash X-Ray Cineradiography: Framing rates up to 100,000 frames per second are possible to record fast events
See 0950

RADIOLUMINESCENCE

Tritium Radioluminescent Lighting Developed for Remote Sites
See 1021

Tritium Radioluminescent Lighting Developed for Remote Sites
See 1021

RADIOMETERS

Lensless Scanning Telescope: Proposed dual-aperture device minimizes aliasing
See 0506

Solar-Collector Radiometer: Unit measures up to 30,000 solar constants with 1 percent accuracy
See 0562

RADIOPHARMACEUTICALS

Lead(203)-Tris-hydroxymethyl Aminomethane: A Radiopharmaceutical For Detection and Localization of Tumors
See 0865

RADIOTHERAPY

Device Developed to Treat Head and Neck Tumors
See 0044

RAIL TRANSPORTATION

Survivability of Nuclear-Waste Casks: Test program simulated railroad accidents to evaluate the safety of these casks
See 0568

RAIN

Rain and Dew Detector: Moisture between finger-like electrodes actuates a simple alarm circuit
See 0554

RANDOM NUMBERS

Generating Random Number Pairs: An algorithm generates pairs drawn from a bivariate normal distribution
See 0201

RANGE FINDERS

Self-Modulated Laser Rangefinder: Longitudinal resonance modes are exploited
See 0560

RANGE GRASSES

Tool For Rangeland Management and Research Is Developed
See 0032

RAPID SOLIDIFICATION
Directional Solidification of Monotectic Alloys: Cooling at certain rates produces fibrous composite structures
See 0768
Producing Metallic Glasses With Acoustic Levitation: Acoustic fields support and cool liquid particles
See 0814
Rapid Solidification Processing Research Atomizer Constructed
See 0555

REACTION KINETICS
Measuring Epoxy-Curing Kinetics: Key reaction parameters are estimated from a single run
See 0110

READING
Computer Readability Editing System Developed
See 0195

RECEIVERS
Advanced Technology UHF Receiver Study: Effect on UHF television allotments
See 0176

RECIRCULATING BED REACTORS
New Insights Into Recirculating Bed Reactors: Coal mixer modeling and coal hydrodesulfurization are examined
See 0417

RECOMBINATION CENTERS
Electron Beam Could Probe Recombination Centers: Properties of multilevel deep traps could be investigated
See 0478

RECORDING INSTRUMENTS
Electronic Score Pad Developed
See 0949
Portable Data Logger for Photovoltaic Panels: Instrument measures rapidly changing knee of V-I curve with extra care
See 0545

RECTENNAS
Printed Circuit Converts RF Energy to dc Power: An ultra-light-weight, large-area, antenna/rectifier has 85 percent conversion efficiency
See 0281

RECYCLING
Tube Recycling by Rotary Forging: Substantial cost savings are possible
See 0737

REDUNDANT COMPONENTS
Coaxial Redundant Drives: Harmonic drives allow redundancy and high output torque in a small package
See 0605

REFLECTORS
Decoupling a Reflecting Layer From Its Support Structure: Proposed mounting isolates the main support through intermediate flexural supports
See 0232

REFRACTORIES
Materials for Fluorine-Rich Environments
See 0798

REFRIGERATORS
Ionic Refrigerator: With no moving parts, a proposed refrigerator would have a long life
See 0662
Magnetic-Wheel Refrigerator: Magnetocaloric machine offers high efficiency and a wide range of cooling temperatures
See 0672
Two-Evaporator Refrigerator With Refrigerant Mixture: Results of optimization study are tested
See 0372

REGISTRIES
Animal Tissue Specimens Available
See 0843

REGRESSION ANALYSIS
Non-linear Regression Program Developed
See 0211
Non-Linear Regression Program Fits Data to Non-Linear Models: Personal Microcomputers Used
See 0212

REGULATORS
Improved Two-Phase Switching Regulator: The coupled-inductor polyphase regulator has better efficiency and lower inductor losses
See 0259

REINFORCED PLASTICS
Stronger Carbon Fibers for Reinforced Plastics: New process makes fibers 70 percent stronger at lower carbonization temperatures
See 0835

RELEASE MECHANISMS
Locking Bolt: A locking ball in the bolt head holds the wrench in place
See 0667

RELEASE TAGS
A New Class of Chemical Labels Has Been Developed
See 0118

RELIABILITY
Characterization Methods for Composite Reliability: Chemical, physical and mechanical tests are described
See 0751
Determining Normal-Distribution Tolerance Bounds Graphically: Graphical method requires minimal calculations and table lookup
See 0619

RELIABILITY(ELECTRONICS)
Poisoning of Semiconductors
See 0544
Universal Pin Electronics Tester: Improved performance and reliability are obtained at reduced cost
See 0582

REMOTE CONTROL
Improving Control of Remote Manipulators: Commands and sensor signals are processed by computer to improve performance feel
See 0655

REMOTE HANDLING
Remote Manipulator Has Realistic Feel: The operator feels the load but not the manipulator inertia or friction
See 0697

REMOTE SENSING
Detecting Methane Leaks: A remote sensor uses laser radiation backscattered from natural targets
See 0462
LANDSAT Emergency Access and Products (LEAP)
See 0148
Optical Receiver for a Prototype Remote-Sensing Natural Gas Leak Detector
See 0542
Procedures For Airborne Sensors Are Developed
See 0551

RENEWABLE ENERGY SOURCES
Analyzing Resource Recovery From Waste: The economics of conventional landfill disposal can be compared with the economics for material and energy recovery
See 0383
Renewable Energy for Industry: Guidance is given for evaluating and financing biomass, waste, solar, and wind sources
See 0365

RESCUE EQUIPMENT
Inflatable Rescue Capsules: Rescue spheres transfer people from a disabled vehicle to a rescue vehicle
See 1002

RESERVOIRS
Descriptions For Reservoir Chemical Processes Are Developed
See 0144
Numerical Models of Water Quality Conditions Are Developed
See 0419

RESIDENTIAL BUILDINGS
The Benefits of Thermal-Energy Storage: Residential sector using this technology may save an estimated 80 million barrels (12.7 x 10(6) m(3)) of oil annually by the year 2000
See 0304
Instrumentation for an Energy-Conserving House: Sensors, data logging, and data processing are described
See 0075

RESOLVERS
Circuitry for Angle Measurements: An angle resolver is pulsed and read under microprocessor control
See 0457

RESONANCE IONIZATION MASS SPECTROMETRY
Resonance Ionization Mass Spectrometry
See 0131
Resonance Ionization Mass Spectrometry
See 0557

RESONATORS
Stable Resonators for Temperature-Compensated Oscillators: SC-cut crystals offer superior stability with less sensitivity to cutting error
See 0293

RESPIRATORY SYSTEM
Heart-Rate and Breath-Rate Monitor: Off-the-shelf components measure physiological rates to an accuracy of 1 pulse/minute
See 0049

RETINOIC ACID
Drug for Skin Diseases is Successful for Treating Arthritis
See 0855

RETORTING
Combined Retort and Combustor for Oil Shale: Continuous fluidized-bed process extracts both fuel and heat
See 0312
Retort Utilizes Oil-Shale Fines: Additional energy is extracted, and waste disposal is simplified
See 0929

REVERBERATION
Design Considerations of Reverberating Chamber
See 0461

RHENIUM
Rhenium Prevents Corrosion: Thrust chamber is protected from corrosive fuel during burns
See 0821

RIDE QUALITY
Vehicle Ride Quality Meter
See 0583

RIVERS
Numerical Models of Water Quality Conditions Are Developed
See 0419

ROADS
Bituminous Equipment for Road Paving: Present and future areas of development are presented
See 0142

ROBOTS
Circuitry for Angle Measurements: An angle resolver is pulsed and read under microprocessor control
See 0457
Extremely Accurate Robotic Movement Module is Demonstrated
See 0634

Holder for Fragile Parts: A fixture with many springfingers holds irregularly-shaped parts
See 0648
Improving Control of Remote Manipulators: Commands and sensor signals are processed by computer to improve performance feel
See 0655
Preparing Solar Cells for Soldering: Solder paste and contact ribbon are dispensed in synchronism
See 0358
Robotic Off-Line Programming Applications Is Demonstrated
See 0706
Robotic Water-Blast Cleaner: Automated system will be fast, safe, and efficient
See 0707
Task Board Tests Manipulator Performance: Robotics systems can be quantitatively evaluated
See 0723
Three-Fingered Robot Hand: Mechanical joints and tendons resemble those of a human hand
See 0726
Three-Level Control of Manipulators: Hierarchical control yields fast response
See 0727
Workshop on Robotics: Tutorial papers are compiled
See 0742

ROCKET ENGINES
Rhenium Prevents Corrosion: Thrust chamber is protected from corrosive fuel during burns
See 0821

ROCKET PROPELLANT INJECTORS
Drilling Precise Orifices and Slots: A combination of mechanical drilling and EDM is used
See 0621

ROCKS
Determining Tensile Strength of Rocks: Simple, inexpensive method provides tensile strength of rock
See 0903
Predicting Rubble Motion in Blasts: Computer model makes it possible not only to blast rock but also to move the broken rubble in a predictable manner
See 0925

ROLLER BEARINGS
Portable Roller Staking Tool: Staking tool is compact and portable
See 0686

ROOF BOLTERS
Better Roof Bolter Dust Collector Maintenance Reduces Silica Dust Levels
See 0896

ROOM FIRES
Computer Program Simulates Room Fires and Estimates Safet Egress Time
See 0071

ROPE
Frictional Hold of Various Sheave Configurations Studied
See 0146
Magnetic Wire-Rope Tester: Rope interiors can be inspected nondestructively
See 0511

ROTORS
Design and Fabrication of Composite Tail Rotor Components: Composites provide higher strength and lower weight
See 0616
Rotatable Vacuum-Seal Assembly: Seal retains vacuum without friction between the rotor and the stator
See 0822

RUBBER
Estimating the Degree of Cross-Linking in Rubber: A new analysis of both the extension and retraction may give better estimates
See 0775
More Durable Tread for Tracked Vehicles: Aramid fibers added to tread rubber seem to increase durability
See 0804
Nonpetroleum Substitutes for Rubber: Several blends of reinforcement fillers are evaluated
See 0807

RUNGE-KUTTA METHOD
Obtaining Runge-Kutta Solutions Between Time Steps: A new interpolation method is used with existing Runge-Kutta algorithms
See 0980

RUTHENIUM ISOTOPES
Researchers Produce a Tumor Localizing Agent
See 0884

SAFETY
Control-Chain Safety Tray and Friction Pull: A sprinkler-system control chain is stored above a suspended ceiling
See 0611
Lithium/ulfuryl Chloride Battery: Safety and long shelf life are sought
See 0349
Occupational-Safety Workshops: Safety-management-control programs are offered
See 0879
Smoked Fishery Products: Increasing Safety and Acceptability
See 0031

SAFETY DEVICES
Wire Retrieves Broken Pin: A safety wire retains the pieces of a broken tool
See 0741

SAMARIUM ALLOYS
Rare Earth/Cobalt Permanent Magnets: Magnets allow significant simplifications in circuit design
See 0285

SAMARIUM CONTAINING ALLOYS
Samarium Alloys for Permanent Magnets: These materials offer the potential for high-performance, lightweight magnets for electronic devices
See 0823

SAMPLERS
An Instrument for the Investigation of Particle Fluxes in Marine and Fresh Waters
See 0499

SANDERS
Controlling Sanding Depth: A mounting fixture for a rotary sander ensures a uniform finish
See 0614

SANDWICH PANELS
Low-Weight Inserts for Aluminum Honeycomb Panels: Fiber/epoxy composites would be used in place of solid aluminum
See 0795

SAW DEVICES
Manufacturing Surface-Acoustic-Wave Devices: Work on an early phase of manufacturing development is described
See 0268
Surface-Acoustic-Wave Frequency Synthesizer: Synthesizer will operate in the 1,296-to 1,533-MHz frequency range with 3-MHz step size
See 0297

SAWDUST
Making Food From Sawdust
See 0027

SCANNERS
Electronically-Scanned Pressure Sensors: Sensors do not have to be pneumatically switched
See 0481
Portable X-Y Scanner: Lightweight device uses just one drive motor for surface scanning
See 0548

SCORE PADS
Electronic Score Pad Developed
See 0949

SCRUBBERS
Mobile System for Extracting Spilled Hazardous Materials from Excavated Soils
See 0411
Scrubber in Blowing Section Offers Good Ventilation Taking 50 'Foot Cuts
See 0930

SEA ICE
Radar for Mapping Sea Ice: X-band system would have 100 sq m resolution
See 0946

SEA WATER
Seawater Hydraulic Motor Under Development
See 0708

SEALERS
Low Cost Bridge Deck Surface Treatment
See 0149

SEALING
Plastic-Sealed Hybrid Power-Circuit Package: Concept uses a plastic hermetically sealed package
See 0278

SEALS(STOPPERS)
Better Seals for Vacuum Bags: A roller tool spreads an even layer of adhesive
See 0749
Calculating Static-Seal Leakage Correlation: Operational leakage rates of various working fluids are predicted from test data
See 0750
Damping Seals for Turbomachinery: Seals perform a dual function while permitting higher speeds
See 0766
Improved Gas Seal for Electrolytic Cells: Breakage by differential thermal expansion is reduced
See 0103
Liquid-Oxygen-Compatible Cement for Gaskets: Fluoroelastomer and metal are bonded reliably by a new procedure
See 0793
Rotatable Vacuum-Seal Assembly: Seal retains vacuum without friction between the rotor and the stator
See 0822

SECURITY
Focal-Plane-Array Optical Proximity Sensors: Objects are detected at beam-axis intersections
See 0640
Guide Helps Evaluate Computer Security
See 0203
Guide Helps Evaluate Computer Security
See 0203
Security Package for the VAX: Four programs deal with intruders and resource management
See 0216
Steel Grating Cage Provides Secure Enclosure
See 0158

SEDIMENT TRANSPORT
Nearshore Sediment Transport Study, Torrey Pines Experiment
See 0943

SEEDS
Gene Cloning May Sprout Super Seeds
See 0862

SEISMIC DETECTION
Borehole Seismic Unit: Fracture orientation can be measured by using a triaxial geophone package located within the wellhole
See 0897

SEMICONDUCTING FILMS
Improved Silicon-Growth Chamber: Improvements include a better transport mechanism and a better trough heater
See 0654

SEMICONDUCTOR DEVICES
Electrolytic Sharpening of Diode-Contact Whiskers: Phosphor bronze wire is pointed without highly-toxic chemical reagents
See 0239

Formation of Supersaturated Alloys for Semiconductor Device Applications
See 0249

High Field Zinc Oxide Varistors
See 0251

High-Power Switching Transistor: Improved switching transistors handle 400-A peak currents and up to 1,200 V
See 0254

Planar-Doped Barrier Semiconductors: New classes of electronic devices are being evolved
See 0277

Poisoning of Semiconductors
See 0544

Test Pattern for IC's: Random-fault densities are measured in an array of standard structures
See 0570

Ti/Pd/Cu Contacts for Semiconductor Devices: Copper systems are equivalent in performance to silver or gold systems
See 0298

SEMICONDUCTOR DOPING

Improved Electrostatic Optical System: The device is suitable for molecular epitaxial formation of semiconductor components
See 0653

SEMICONDUCTOR LASERS

Measuring Excess Noise in SDL's: A simple system measures noise deviation in semiconductor-diode lasers
See 0516

SEMICONDUCTORS(MATERIALS)

Characterizing Aluminum/Gallium Arsenide Semiconductors: Mechanisms of operation are elucidated
See 0959

Determining the Point of Zero Zeta Potential in Solid Samples: In a new technique, the sample does not have to be in powder form
See 0467

Electron Beam Could Probe Recombination Centers: Properties of multilevel deep traps could be investigated
See 0478

Poisoning of Semiconductors
See 0544

SENSORS

Coolant-Level Sensors for Nuclear Reactors: Proposed sensors detect the loss of coolant at an early stage of an accident
See 0460

SEPARATION

Classifying Particles by Acoustic Levitation: Separation technique is well suited to material processing
See 0603

Membrane Separation Overview Published
See 0112

New Liquid Compound Separation Technique Developed
See 0119

SEPARATORS

Interelectrode Separator for Lithium Cells: Enhanced wettability is obtained
See 0346

SERODIAGNOSIS

Digital Filter for Detecting Infectious Diseases: Low-speed, low-pass filter extracts information from noise-obscured data
See 0045

Serological Detection of Antibodies to HTLV-III in Sera of Patients with AIDS and pre-AIDS Conditions
See 0885

SERVOMECHANISMS

Purely Fluidic Servomechanisms: Fluidic integrated components are a feasible alternative
See 0691

SEWAGE TREATMENT

Turning Wastes Into Resources: Report describes innovative improvements in sewage management
See 0441

Wastewater Treatment with Plants in Nutrient Films
See 0444

SEWERS

EPA Macroscopic Planning Model (EPAMAC) for Stormwater and Combined Sewer Overflow Control: Application Guide and User's Manual
See 0399

SHALE OIL

Preventing Moisture Damage to Bituminous Materials: Damage inhibitor is abundant in shale oil
See 0152

SHAPE MEMORY EFFECT

Properties of Nickel/Titanium Wire and Tubing: Data on two useful forms of shape-memory alloy are presented
See 0815

Shape-Memory Couplings for Emergency Repairs: Damaged hydraulic lines can be repaired to nearly new condition
See 0712

SHEAR PROPERTIES

Characterizing Shear Properties of Membranes: Shear stiffness is determined for use in vibration analysis
See 0755

SHEAR TESTS

Sample Holder for Cryogenic Adhesive Shear Test: Five samples would be tested in one cooldown
See 0558

SHEET METAL

Materials Laboratory Demonstrates Automated Sheet Metal Blanking Cell
See 0674

SHEET METALS

Fabricating Slotted-Waveguide Arrays From Sheet Metal: Low-cost lightweight waveguides are formed from rolls of aluminum
See 0246

SHIP ANCHORS

Engineering Data Base Aids in Selection and Sizing of Anchors
See 0941

SHIP HULLS

Compliant Coatings for Turbulent Drag Reduction Under Development
See 0939

SHIPBOARD LANDING

Coating for Carrier Decks Improved
See 0004

SHIPS

Engineering Data Base Aids in Selection and Sizing of Anchors
See 0941

A Test for the Recovery of Waste Energy in a Fishing Vessel
See 0947

SHOCK ABSORBERS

Shock Mounting for Heavy Machines: Elastomeric bearings eliminate extraneous forces
See 0713

SIALON COATINGS

Depositing Sialon Coating on Turbine Rotors: Sialon layer is formed on a refractory substrate via chemical-vapor deposition
See 0162

SICKLE CELL ANEMIA

Sickle Cell Anemia: New Approaches To Therapy
See 0886

SIGNAL DEVICES

Air Pyrotechnic Signals Are Tested
See 0449

SIGNAL PROCESSING

Digital SAR Processor: It produces real-time, single-look, high-resolution imagery
See 0233

Eliminating Doppler Effects in Synthetic-Aperture Radar Optical Processors: A pair of photodetectors generates correction signals
See 0243

NRZ Data Asymmetry Corrector and Convolutional Encoder: Circuit compensates for timing, amplitude, and symmetry perturbations
See 0185

Processing of Synthetic-Aperture-Radar Data: Ambiguous data are combined to permit fast-transform convolution
See 0282

Rounding Technique for High-Speed Digital Signal Processing: An arithmetic technique facilitates high-speed rounding of 2's-complement binary data
See 0215

VLSI Unit for Two-Dimensional Convolutions: Proposed chip could be used for a variety of functions
See 0223

SIGNAL TO NOISE RATIO

Frequency-Diversity Reception for Phase Modulation: Signal-to-noise ratio would be improved
See 0183

SILANES

Combined Silane Pyrolysis and Silicon-Particle Melt: Melter directly coupled to pyrolyzer would eliminate difficulties of transport
See 0093

Measuring Trace Hydrocarbons in Silanes: The technique is rapid and uses standard analytical equipment
See 0111

SILICON

Cold-Crucible Premelter for Silicon: A quartz crucible is refilled with molten silicon between crystal-growth cycles
See 0092

Combined Silane Pyrolysis and Silicon-Particle Melt: Melter directly coupled to pyrolyzer would eliminate difficulties of transport
See 0093

Fracture Strength of Silicon Solar Cells: Tests during processing show the way to reduce breakage and increase yield
See 0331

Gas-Jet Meniscus Control in Ribbon Growth: Analysis finds jet parameters to control thickness of ribbon pulled vertically from melt
See 0643

Improved Radiative Control of Ribbon Growth: Shield modifications enhance growth rate while reducing silicon oxide formation
See 0104

Low-Contamination Vibrating Feeder for Silicon Chips: Making the trough top surface out of semiconductor-grade silicon would reduce contamination
See 0668

Low-Cost GaAs Solar Cells: A silicon substrate lowers cost and increases efficiency
See 0352

Measuring Diffusion and Recombination in Polycrystalline Silicon: Light-beam-induced currents yield information about solar-cell material
See 0354

Melt-Level Sensing in Silicon-Web Growth: The shift of a laser beam reflected from the melt surface is sensed by a position detector
See 0675

Oscillating-Crucible Technique for Silicon Growth: Technique would yield better mixing of impurities and superior-quality crystals
See 0122

Processor Generates and Extracts Silicon: An impinging jet/funnel system separates the silicon and salt formed in the reduction of silicon tetrachloride by sodium
See 0130

Sodium Spray Would Speed Silicon Production: The production rate of solar-grade silicon in a sodium/silicon tetrafluoride reactor would be increased by a spray feed
See 0132

Starting Silicon-Ribbon Growth Automatically: A programable two-channel controller reproduces standardized growth conditions
See 0134

Studies of the Inverted-Meniscus Deposition of Silicon on Ceramic: Controlled temperature profiles are essential to the production of solar cells
See 0836

Two-Temperature-Zone Silicon Reactor: Temperature profile confines SiF4 reduction by sodium to the reactor bottom
See 0138

Ultrasonics and Optics Would Control Shot Size: Uniformly-sized silicon shot would be produced by a proposed feedback system
See 0738

SILICON CARBIDES

High-Strength Structural Ceramics: Microstructural flaws are reduced by a new process for making silicon carbide
See 0786

Low-Temperature Growth of SiC Single Crystals: Reasonable growth rates are obtained at 1,330 to 1,500C
See 0108

SiC-AlN Ceramics: New ceramic material for diesel engine application is characterized
See 0827

Silicon Carbide-Based Structural Ceramics: Process produces strong silicon carbide ceramics
See 0828

SILICON COATINGS

Improved Silicon-Growth Chamber: Improvements include a better transport mechanism and a better trough heater
See 0654

SILICON DIOXIDE

Effects of Heavy-Charged Particles on MOS IC's: Although such particles are not troublesome now, they could be in the future
See 0237

Epoxy Grout With Silica Thickener: Grout cures quickly, even in the presence of hydraulic oil
See 0773

Low-Temperature Water Diffusion in SiO2 Thin Films: Nuclear-resonance profiling looks into the formation mechanism of IC thin films
See 0109

Rewaterproofing Silica Tiles: A waterproofing agent is deposited deep into pores
See 0820

SILICON HYDRIDES

Preparing Pure Silicon Monohydride: RF-sputtering process produces substantially pure amorphous silicon monohydride
See 0127

SILICON NITRIDES

Gas-Pressure Sintering Process: High-performance silicon nitride ceramics are produced
See 0644

Predicting Life of Ceramic Components in Gas Turbines: Experimental and analytical results are compared
See 0170

SILICON TETRAFLUORIDE

Generating SiF4 From H2SiF6: Sodium and barium fluorosilicates are precipitated and then thermally decomposed into silicon tetrafluoride
See 0100

SILICONES

Corrosion Effects of Mixed Brake Fluids: Addition of new silicone brake fluid to conventional ones does not significantly increase corrosion
See 0757

SILVER

Removal and Recovery of Silver From Photographic and Photoreproduction Effluents
See 0427

SIMULATORS

New Device Simulates Realistic Vibration in Flight Vehicles
See 0535

Training Simulator for Fire Management: Users manipulate resources in practicing fire-control strategy
See 0082

Visual Database Conversion Program Developed
See 0222

SINGLE CRYSTALS

Low-Temperature Growth of SiC Single Crystals: Reasonable growth rates are obtained at 1,330 to 1,500C
See 0108

SINTERING

Gas-Pressure Sintering Process: High-performance silicon nitride ceramics are produced
See 0644

Measuring Elastic Modulus of Sintered Metal: Technique minimizes the effect of the substrate on a thin sintered coating
See 0800

Predicting Sintered-Metal Resistivity From Porosity: An equation with one adjustable parameter fits the experimental data for nickel
See 0810

SITE SURVEYS

Methods for Determining the Location of Abandoned Wells
See 0920

SKIN FRICTION

Instrument Measures Airflow Friction Without Contact: A laser interferometer monitors the thickness of a shearing oil film
See 0501

SKIN(ANATOMY)

Further Developments Made in Artificial Skin
See 0860

SKYLIGHTS

Daylighting Can Cut Energy Use
See 0073

SLAG DISPOSAL

Monitoring the Thickness of Coal-Conversion Slag: Proposed technique adapts analogous ocean-floor-mapping technology
See 0415

SLUDGE DISPOSAL

Alternate Treatment of Organic Solvents and Sludges from Metal Finishing Operations
See 0380

Analytical Procedures for Aniline and Selected Derivatives in Wastewater and Sludge
See 0382

Oily Sludges: A Physical Characterization
See 0421

Treatment of Plating Wastewater: A survey of treatment practices shows need for uniformity and improvements
See 0440

SLUDGE DRYING

Solar Drying of Sludge: Greenhouse Versus Open Bed: The protection greenhouses afford against rain may not be necessary
See 0432

SLURRIES

Measuring Slurry Flow: Noncontact ultrasonic instrument is accurate and versatile
See 0520

Pressurized Slurry-Feed System: System avoids pumpage dilution and contact between pumps and abrasive liquids
See 0926

SMALL ANGLE SCATTERING

Neutron Scattering Is Used To Study Structures In Epoxies
See 0116

SMOKE GENERATORS

Low-Temperature Plenum System Used for Firefighting Training Smoke Generators
See 0077

SNOW

Measuring Snow's Liquid Water Content
See 0522

SODIUM

Poisoning of Semiconductors
See 0544

SOFTWARE

Advanced System for Process Engineering
See 0086

Air Force Develops Subjective Workload Assessment Technique
See 0040

Air Land Water Analysis System (ALWAS): A Multi-Media Model for Toxic Substances
See 0379

Analysis of Short-Rotation Forests: Economic strategies are evaluated
See 0892

Asbestos Removal And Disposal Information System
See 0385

Axial Compressor Design and Analysis: Program yields blade configurations and aerodynamic flow fields
See 0594

Boundary-Layer Equations for Two-Dimensional and Axisymmetric Flow: Finite-difference procedure solves for laminar, transitional, or turbulent flows
See 0957

BURST - A Computer Program of a Meteor Burst Communications Model Used to Predict the Reliability of a Communications System That Uses Meteor Bursts as the Communications Channel
See 0177

Calculating the Flow Field in a Radial Turbine Scroll: Finite-difference and finite-element methods give glow solutions
See 0160

Compressible Flow About Wind Turbine Blades: Program solves the three-dimensional potential equation for flow through an arbitrary rotor
See 0313

Compressible Stability Analysis Code for Transition Prediction in Three-Dimensional Boundary Layers: Black box code for swept and tapered wings
See 0005

Computer Aided Structural Engineering Project Develops
See 0070

Computer Model Developed to Help Predict Solutions to Electrostatic Precipitators Problems
See 0390

Computer Program Available To Calculate Fluid Properties
See 0094

Computer Program for Chemically Reactive Fluid Flow: Program solves the equations of transient multicomponent chemically reactive fluid dynamics
See 0960

Computer Program Simulates Room Fires and Estimates Safet Egress Time
See 0071

Computer Programs Have Been Developed for Nonlinear Least Squares
See 0194

Computer Simulates Organogenesis
See 0851

Configuration Analysis Tool: An interactive program for storing information and generating reports on project configuration management
See 0196

Crash Simulation and Nonlinear Structural Analysis: Behavior of structures composed of trusses, frames, and membranes is modeled
See 0006

Design of Multistage Axial-Flow Compressors: Computer program develops blading geometry and performance parameters
See 0617

Dissociated Airflow Effects During Plasma-Arc Testing: Program computes heating rates and surface-friction effects
See 0008

Extended Vortex Lattice Method: Aerodynamic characteristics are determined for up to four complex planforms
See 0009

Fast Generation of Boundary-Conforming O-Type Grids: Algorithm generates grids for arbitrary wing-body and axial turbomachinery geometries
See 0010

Flexible Method for Analyzing Bird Band Recovery Data
See 0858

Flow Over Nonaxisymmetric Nozzles: Code solves three-dimensional Navier-Stokes equations
See 0966

Flow Through a Rotating Turbomachinery Blade Row: Full potential, transonic quasi-three-dimensional flow is calculated
See 0163

Forest Resource Information System: Twenty-three processing functions aid in utilizing LANDSAT data for forest resource management
See 0910

Interactive Graphics Analysis for Aircraft Design: Aircraft geometry is displayed on an interactive terminal
See 0011

Lift Effect of Cambered Calculating the Vortex-Wings: Program computes the vortex-lift effect by using an improved supersonic suction analogy
See 0012

Linear Control System Design Analysis
See 0263

Liquid Pathway Dose Calculations (LADTAP2)
See 0866

Memory-Efficient Energy Network Has Been Developed
See 0355

Minimum Induced Drag of Nonplanar Wings: Numerical optimization techniques calculate the required bound-circulation distribution
See 0013

Monte Carlo Investigation of Trajectories: Orbital sequences are modeled, simulation statistics generated, and user-requested variables scanned
See 1004

New Program Will Analyze Microelectronic Test Data
See 0274

Non-Linear Regression Program Fits Data to Non-Linear Models: Personal Microcomputers Used
See 0212

Nonlinear Stress Concrete Structures Program
See 0078

Off-Design Turbine Modeling: Off-design efficiency and flow function are obtained from design-point input data
See 0166

PANEL Code for Planar Cascades: Plane cascade flow is solved using improved surface-singularity methods
See 0169

PCG Software for Producing Computer Graphs
See 0213

Predicting Aircraft Noise Levels: Program predicts noise levels from data on fan, combustor, turbine, and airframe sources
See 0017

Random Life Curves for Common Engineering Materials: Program incorporates non-Rayleigh effects in evaluating structure life
See 0984

Security Package for the VAX: Four programs deal with intruders and resource management
See 0216

Shock-Free Airfoil Cascades: Fast design and analysis uses fictitious gas concept
See 0988

Shuttle Communications Blackout Study: The RF power loss through a three-dimensional plasma sheath is computed
See 0190

Shuttle Inventory Management: All supply activities and requirements are controlled from a single point
See 1007

Simulating Mechanical Control Operations: A computer model can simulate mechanical harvesting operations using any specific mechanical system operated in any realistic environment
See 0887

Software For Image Manipulation
See 0217

Software Specification Language: SSL translator aids in developing and checking software systems
See 0219

Software Specifications Adopted by ANSI Committee
See 0220

Solar Energy Studies Computer Program Developed
See 0081

Solutions of Transonic Flow in Turbomachines: Accurate approximations are obtained using perturbation techniques
See 0368

Solutions of Transonic Flow in Turbomachines: Accurate approximations are obtained using perturbation techniques
See 0717

Spare Parts Inventory Control System Software
See 0221

Steady, Nonrotating, Blade-to-Blade Potential Transonic Cascade Flow Analysis Code: Program numerically solves an artificially time-dependent form of the actual full-potential equation
See 0991

Subcritical Wing Design Code: program uses higher-order far-field drag minimization
See 0018

Thermal Elastohydrodynamic Lubrication of Spur Gears: Program and analysis predict lubricant film thickness and the variations of dynamic load and temperature
See 0838

Thermal Modeling of Bridgman Crystal Growth: Heat flow is modeled for a moving or stationary rod-shaped sample inside a directional-solidification furnace
See 0994

Thermal Radiation Model Renodalization: Simplified radiation models reduce programing cost
See 0995

Time-Domain Modal Vibration Identification: Natural frequencies, damping factors, and damped mode shapes are identified
See 0996

Transonic, Axisymmetric Flow Over Nozzle Afterbodies With Supersonic Jet Exhuasts: Predictions require less computation than the Navier-Stokes solutions
See 0019

WATEQF - A FORTRAN IV Version of WATEQ, a Computer Program for Calculating Chemical Equilibria of Natural Waters (1984 Version)
See 0141

Wing Subsonic Aerodynamic Performance Estimates: Solution by iteration estimates performance of twisted and cambered wings of arbitrary planform
See 0020

SOFTWARE ENGINEERING

Measuring Software-Execution Time: Test circuit times routines even during multiprogram operation
See 0210

Software Specification Language: SSL translator aids in developing and checking software systems
See 0219

SOIL PROPERTIES

Measuring Temperature Profiles of Earth's Surface: Thermal properties of earth are measured in situ
See 0524

SOILS

Mobile System for Extracting Spilled Hazardous Materials from Excavated Soils
See 0411

SOLAR CELLS

Annealing Solar Cells With Lasers: Large-area process removes ion damage
See 0301

Detecting Solar-Cell Failures: Circuit identifies a malfunctioning photovoltaic array
See 0317

Detecting Solar-Cell Failures: Circuit identifies a malfunctioning photovoltaic array
See 0463

Determining Solar-Cell Operating Temperature: A laboratory test measures the effect of windspeed and wind direction
See 0465

Developing Standards for Photovoltaic Devices: Ground rules are outlined for evaluating photovoltaic technology
See 0318

Developing Standards for Photovoltaic Devices: Ground rules are outlined for evaluating photovoltaic technology
See 0468

Effects of Outdoor Soiling on Photovoltaic Modules: Airborne contaminants degrade module performances
See 0322

Fast Electronic Solar-Cell Tester: Microcomputer-controlled system gathers current and voltage data
See 0483

Fine-Line Pattern Processing for Photoresist Films: High resolution is obtained in 25-micro m thick resists
See 0637

Fracture Strength of Silicon Solar Cells: Tests during processing show the way to reduce breakage and increase yield
See 0331

Hiding Solar-Array Bus Bars: End terminals are mounted under the cells, maximizing the usable illuminated area
See 0337

Improved Silicon-Growth Chamber: Improvements include a better transport mechanism and a better trough heater
See 0654

Low-Cost GaAs Solar Cells: A silicon substrate lowers cost and increases efficiency
See 0352

Measuring Diffusion and Recombination in Polycrystalline Silicon: Light-beam-induced currents yield information about solar-cell material
See 0354

Portable Data Logger for Photovoltaic Panels: Instrument measures rapidly changing knee of V-I curve with extra care
See 0545

Preparing Solar Cells for Soldering: Solder paste and contact ribbon are dispensed in synchronism
See 0358

Retaining Ring Fastener for Solar Panels: A collapsible linkage enables rapid installation and removal of panels
See 0701

Shielded Aluminum Flat-Conductor Cable: Thin wiring harness stores compactly
See 0288

Solar-Cell Slide Rule: Slide rule relates efficiency, impurity types, impurity concentrations, and process types
See 0367

Studies of the Inverted-Meniscus Deposition of Silicon on Ceramic: Controlled temperature profiles are essential to the production of solar cells
See 0836

SOLAR COLLECTORS

Fabrication of Structural Cellular Glass: A surface layer is quickly heated and compressed
See 0777

Solar-Collector Radiometer: Unit measures up to 30,000 solar constants with 1 percent accuracy
See 0562

SOLAR CONCENTRATORS

Ceramic Solar Receiver: Matrix concept offers efficient heat transfer at high temperatures
See 0309

Freeze/Thaw Properties of Cellular Glass: Without moisture, temperature cycles do no harm
See 0783

Glass for Solar Concentrators: A survey evaluates engineering parameters of commercial glasses
See 0334

Solar-Collector Radiometer: Unit measures up to 30,000 solar constants with 1 percent accuracy
See 0562

Two-Stage Off-Axis Cylindrical Solar Concentrator: The reflector for a photovoltaic power supply uses off-axis geometry for efficient uniform illumination
See 0374

SOLAR COOLING SYSTEMS

Criteria Has Been Established For Solar Heating And Cooling
See 0072

SOLAR ENERGY

Earth as a Residential Heat-Storage Medium: Heat is stored during hot months for use during cold months
See 0320

Extracting Oil From Tar Sands: Oil can be extracted using solar energy
See 0328

National Appropriate Technology Assistance Service Established: The service provides engineering, scientific and commercialization technical assistance for energy-related technologies
See 0357

Renewable Energy for Industry: Guidance is given for evaluating and financing biomass, waste, solar, and wind sources
See 0365

Solar Drying of Sludge: Greenhouse Versus Open Bed: The protection greenhouses afford against rain may not be necessary
See 0432

SOLAR FURNACES

Solar Rotary Kiln: Unit decomposes zinc sulfate and other low-absorptivity materials efficiently
See 0716

SOLAR HEATING

Bricks and Cans for Thermal Storage: Water-filled cans and bricks provide efficient thermal storage for solar space and hot-water heating
See 0305

Criteria Has Been Established For Solar Heating And Cooling
See 0072

How To Build a Solar Space Heater for Your Own Home: Do-it-yourself manual shows how to make inexpensive solar panels that slash heating bills
See 0339

Low-Temperature Solar-Energy Systems: High efficiency is possible for industrial applications
See 0353

Reliability Guidelines for Solar Hot-Water Systems: Document consolidates available information in one publication
See 0080

Solar Energy for Industrial Processes: Thermal systems could provide heat-delivery rates of 2.8 to 3.4 GJ/yr/sq m at a cost of $50/GJ/yr
See 0715

Solar Energy Studies Computer Program Developed
See 0081

Water Panels for Passive Heating: Tankwall sections absorb solar energy with little reradiation to the outside
See 0083

SOLAR PANELS

Edge Supports for Photovoltaic Modules: Mounting strips are patterned after glazing gaskets
See 0321

Preventing Moisture Damage To Solar Panels: A proposed encapsulant would dissociate water into gas
See 0359

SOLAR PONDS

Two-Fluid Solar Pond: Proposed insulated covered cavity would absorb and store solar energy in its lower heavier layer
See 0373

SOLAR POWER GENERATION

Costs of Batteries for Photovoltaic Power Systems: Installed and life-cycle costs for several technologies and applications are evaluated
See 0315

Load Management for Residential Photovoltaic Systems: A simulation of a utility-connected photovoltaic system shows that onsite utilization of photovoltaic-generated electricity is decoupled from system value at reasonable buyback rates
See 0351

Value of Wind and Solar Thermal Energy: Computer programs allow utilities to determine overall electric-energy production costs
See 0375

SOLAR RADIATION

Accelerated Solar-UV Test Chamber: Medium-pressure mercury-vapor lamps provide a high ratio of ultraviolet to total power
See 0446

Pyrheliometer With Improved Accuracy, Instrument maintains components at constant temperature and allows tenfold improvement in instrumental accuracy
See 0553

SOLAR RECEIVERS

Ceramics for Solar Receivers: Materials for high-temperature use are reviewed
See 0310

SOLAR WATER HEATING

Criteria Has Been Established For Solar Heating And Cooling
See 0072

SOLDER JOINTS

Detecting Defective Solder Bonds: The method is noncontact and nondestructive
See 0618

SOLDERING

Preparing Solar Cells for Soldering: Solder paste and contact ribbon are dispensed in synchronism
See 0358

SOLID WASTE DISPOSAL

Alternate Treatment of Organic Solvents and Sludges from Metal Finishing Operations
See 0380

Asbestos Removal And Disposal Information System
See 0385

Assessing Landfill Gas Recovery Projects: Factors are provided for determining technical and economic feasibility of existing landfills
See 0303

Assessment of Landfill Methane Recovery: An assessment of the pros and cons and an annotated bibliography provide information on this untapped energy source
See 0386

Cannon Reduces Municipal Solid Wastes: A pressure vessel uses explosive decompression to shred solid wastes into small particles
See 0388

Formation of Nitrosamines Under Denitrification Conditions: Microbial denitrification systems may produce toxic, carcinogenic nitrosamines
See 0402

Landfill Gas Recovery: Existing and proposed methodologies for the recovery of methane from landfills are surveyed
See 0406

Managing Coal-Combustion Wastes: A variety of options is explored in a guidebook
See 0409

Model Developed To Simulate Dredged Material Movement
See 0412

Modeling Landfill Methane Recovery: Two- and three-dimensional computer simulations are used for the analysis of gas recovery in landfills
See 0413

Monitoring the Thickness of Coal-Conversion Slag: Proposed technique adapts analogous ocean-floor-mapping technology
See 0415

Rapid Assessment of Potential Ground-Water Contamination Under Emergency Response Conditions
See 0424

Recycling Lithium Carbonate/Lithium Hydroxide Waste: A hazardous-waste disposal problem is eliminated by regeneration
See 0425

Retort Utilizes Oil-Shale Fines: Additional energy is extracted, and waste disposal is simplified
See 0929

Safe Disposal of PCB Waste: A variety of disposal technologies are assessed
See 0429

Standardized Procedures for Planting Vegetation on Completed Sanitary Landfills
See 0433

Waste Disposal at Synthetic-Fuel Plants: Disposal is examined from engineering, environmental, and economic viewpoints
See 0442

SOLID WASTES

Analyzing Resource Recovery From Waste: The economics of conventional landfill disposal can be compared with the economics for material and energy recovery
See 0383

Energy and Solid/Hazardous Waste: Data are presented on wastes from a variety of energy technologies
See 0395

Industrial Waste Exchanges: Industrial wastes of one company can be a valuable resource to another
See 0404

Making Food From Sawdust
See 0027

Renewable Energy for Industry: Guidance is given for evaluating and financing biomass, waste, solar, and wind sources
See 0365

Surrogate Hazardous Wastes May Simplify Incinerator Monitoring
See 0435

SOLIDIFICATION

Directional Solidification of Monotectic Alloys: Cooling at certain rates produces fibrous composite structures
See 0768

Quenching Alloys in Containerless Processing: Gas quenching would be combined with magnetic levitation
See 0693

Rapid Solidification Processing Research Atomizer Constructed
See 0555

Solidifying Bi/MnBi at Low Gravity: The intrinsic coercivity of the manganese/bismuth system comes close to the theoretical maximum
See 0830

Thermal Modeling of Bridgman Crystal Growth: Heat flow is modeled for a moving or stationary rod-shaped sample inside a directional-solidification furnace
See 0994

SOLUBILITY

Estimating the Solubility of Gases in Battery Electrolytes: The estimates are in excellent agreement with experimental values
See 0326

SOLUTION MINING

Small Diameter Pumps for In Situ Leaching
See 0714

SOLVENT EXTRACTION

Analytical Methods for Synfuel Production: Techniques sometimes produce differing results from laboratory-to-laboratory
See 0087

Supercritical Fluid Extraction Method is Developed
See 0136

Supercritical-Multiple-Solvent Extraction From Coal: Large and small molecules dissolve different constituents
See 0137

SOLVENTS

Solvent-Resistant Polysulfones: Polysulfones terminated with trimethylsilylethynyl, ethynyl, and phenylethynyl groups have increased solvent resistance
See 0831

SPACE HEATING

How To Build a Solar Space Heater for Your Own Home: Do-it-yourself manual shows how to make inexpensive solar panels that slash heating bills
See 0339

Low-Temperature Solar-Energy Systems: High efficiency is possible for industrial applications
See 0353

Water Panels for Passive Heating: Tankwall sections absorb solar energy with little reradiation to the outside
See 0083

Wood-Fueled Boiler Unit: Study evaluates the efficiency and emissions of a prototype central-heating unit
See 0377

SPACE SHUTTLES

Inflatable Rescue Capsules: Rescue spheres transfer people from a disabled vehicle to a rescue vehicle
See 1002

Large-Scale Software Management System: Changes are organized and controlled according to consistent procedures
See 0208

Shell-Tile Thermal-Protection System: Upper and lower interlocking caps enclose flexible lightweight insulation
See 1006

Shuttle Inventory Management: All supply activities and requirements are controlled from a single point
See 1007

SPACECRAFT

The Design of Lightning Protection: Engineering study could guide the design and monitoring of lightning protection
See 1000

Methods for Estimating Payload/Vehicle Design Loads: Several methods are compared with respect to accuracy, design conservatism, and cost
See 1003

Shuttle Communications Blackout Study: The RF power loss through a three-dimensional plasma sheath is computed
See 0190

SPACECRAFT LAUNCHING

Large-Scale Software Management System: Changes are organized and controlled according to consistent procedures
See 0208

SPACECRAFT TRAJECTORIES

Monte Carlo Investigation of Trajectories: Orbital sequences are modeled, simulation statistics generated, and user-requested variables scanned
See 1004

SPACING

Gage Measures Recessed Gaps: Tool permits fast and easy measurements
See 0487

SPARE PARTS

Spare Parts Inventory Control System Software
See 0221

SPARK MACHINING

Drilling Precise Orifices and Slots: A combination of mechanical drilling and EDM is used
See 0621

Electric-Discharge Machining of Thin Slots: By promoting oil-bath circulation, new method allows 0.01-in. slots to be cut
See 0625

SPECTROCHEMICAL ANALYSIS

Scanning XeCl Laser: Potential applications of the narrow-bandwidth laser include remote sensing and high-resolution spectroscopy
See 0986

Simplified Laser Tuning: Tuning arrangement employs a single grating and two planar mirrors
See 0989

SPECTROMETERS

Hand-Held Field Spectrometer: Portable spectrometer employs microprocessor to provide extended analysis of radiation sources
See 0936

Microwave Spectrometer Developed
See 0057

SPEECH RECOGNITION

Effect of Face Masks on Electronic Speech-Recognizers: A face mask may actually improve recognition accuracy
See 0179

Voice Operated Controls and Switches are Developed
See 0067

SPHERES

Fabrication of Hollow Spheres: A nozzle forms gas-filled spherical shells of high dimensional uniformity
See 0935

Hollow-Sphere Production Line: After initial formation, spheroids are processed without the contaminating touch of solid objects
See 0651

SPINAL CURVATURES

Computer Model Has Been Developed To Assist Orthopedic Surgeons
See 0849

SPORT FISHING

Sea Surface Temperature Maps for Fishermen
See 0030

SPUTTERING

Preparing Pure Silicon Monohydride: RF-sputtering process produces substantially pure amorphous silicon monohydride
See 0127

STABILIZATION

Simplified Procedures Have Been Developed for Calculating Chemical Doses for Water Stabilization
See 0430

Stabilizing Fiber-Optic Transmission Lines: A voltage-controlled optical phase shifter is the key
See 0292

STAINLESS STEELS

Stress-Corrosion Cracking in Martensitic PH Stainless Steels: Precipitation-hardening alloys are evaluated in marine-environment tests
See 0833

STANDARD REFERENCE MATERIALS

Aqueous Solution Standard Reference Materials Are Being Developed
See 0451

Catalog of Standard Reference Materials
See 0454

Petroleum Crude Oil Reference Material Available
See 0124

Standards For Toxic Metals In Human Urine Are Developed
See 0133

STANDARDS

Computer Energy Time Unit Devised
See 0459

Developing Standards for Photovoltaic Devices: Ground rules are outlined for evaluating photovoltaic technology
See 0318

Developing Standards for Photovoltaic Devices: Ground rules are outlined for evaluating photovoltaic technology
See 0468

Digital Phase-Shift Standard: Circuit using just three IC's could be used to perform precise calibration
See 0472

Reference Material Helps Manufacturers Evaluate Performance of Key Measuring Devices
See 0556

Scientists Develop New Millimeter Wave Noise Standard
See 0559

Software Specifications Adopted by ANSI Committee
See 0220

Standards for Epoxies Used in Microelectronics: Report has significant commercial applications
See 0832

STARCHES

Process for Removing Heavy Metal from Water is Developed
See 0423

STATISTICAL ANALYSIS

Computer Programs Have Been Developed for Nonlinear Least Squares
See 0194

Determining Normal-Distribution Tolerance Bounds Graphically: Graphical method requires minimal calculations and table lookup
See 0619

Generating Random Number Pairs: An algorithm generates pairs drawn from a bivariate normal distribution
See 0201

STEAM FLOW

Pressure Reducing Valve (PRV) To Measure Steam Quality
See 0687

STEAM VALVES

Pressure Reducing Valve (PRV) To Measure Steam Quality
See 0687

STEELS

Anisotropic Embrittlement in Hard ESR Steel Forgings: The short transverse direction loses ductility
See 0747

CAD/CAM for Foundry Castings: High-quality steel-sand castings can be made quickly, inexpensively, and accurately
See 0598

Corrosion-Prevention for Steel Stovepipes: Several materials were found to extend the service life significantly
See 0759

Crack Growth and Toughness in TRIP Steel: Postulated rate equation integrated for specimen geometry is recommended as a method of analyzing crack growth
See 0760

Crack Growth in Low-Alloy, High-Strength Steel: Model examines environmental and stress effects on crack growth
See 0761

Crack Initiation and Propagation in Alloys: Study characterizes mercury-embrittled aluminum, steel alloys, and brass
See 0762

Dual-Phase Steel for Low-Temperature Application: Study characterizes the suitability of this steel for Arctic-temperature applications
See 0771

Fatigue Life of Notched-Steel Specimens: Fatigue crack growth results are presented for a series of bending tests of high-strength, notched-steel specimens
See 0778

Fracture Resistance in Carburized Steels: Study evaluates carburized steels for high-temperature service in helicopters
See 0782

High-Speed Metal Removal: Ceramic inserts provide higher cutting speeds and longer life
See 0646

Hydrogen Embrittlement in ESR 4340 Steel: The type of remelt process correlates with susceptibility
See 0787

Intercritically Rolled Steels: Dynamic characteristics of these hard, fracture-resistant materials are presented
See 0791

Mechanical Property Characterization of 4340 Steel: Forgings made from split argon/oxygen decarburized (AOD) heat of 4340 steel are compared for ballistic and mechanical properties
See 0801

Preparation of Steel Specimens for Inclusion Assessment: Two metallographic sample preparation methods produce flat, scratch-free surfaces without losing the inclusions
See 0812

STEROIDS

Bone Damage Linked To Long-Term Steroid Therapy
See 0848

STIRRERS

Stirred Reactor Dynamics: Effects of the vortex induced by a stirrer are examined
See 0135

STORAGE

Preserving Color in Developed Photographic Film: Sealed storage container has moist nonoxidizing atmosphere to retard fading
See 0952

STORAGE BATTERIES

Measuring Power Flow in Electric Vehicles: Instrument accommodates switching transients and common-mode voltages
See 1015

STORM WATER RUNOFF

EPA Macroscopic Planning Model (EPAMAC) for Stormwater and Combined Sewer Overflow Control: Application Guide and User's Manual
See 0399

STOVEPIPES

Corrosion-Prevention for Steel Stovepipes: Several materials were found to extend the service life significantly
See 0759

STRAIN GAGES

Electronic Dilatometer: A nonclamping micrometer measures small strains
See 0479

Electronic Force Gage for Welders: Welding force is monitored in process
See 0480

Foil-Resistance Strain Gages: Annealed-constantan, high-elongation gages are used to measure large strains with errors of only a few percent
See 0486

STRESS ANALYSIS

Estimating the Degree of Cross-Linking in Rubber: A new analysis of both the extension and retraction may give better estimates
See 0775

Multipurpose X-Ray Residual-Stress Analyzer: System is portable for field inspections
See 0533

Nonlinear Stress Concrete Structures Program
See 0078

Random Life Curves for Common Engineering Materials: Program incorporates non-Rayleigh effects in evaluating structure life
See 0984

X-Ray-Diffraction Residual-Stress Analysis: Nondestructive method allows measurement of surface stresses in metal and ceramic materials
See 0591

STRUCTURAL ANALYSIS

Crash Simulation and Nonlinear Structural Analysis: Behavior of structures composed of trusses, frames, and membranes is modeled
See 0006

Neutron Scattering Is Used To Study Structures In Epoxies
See 0116

STRUCTURAL DESIGN

Computer Aided Structural Engineering Project Develops
See 0070

Interactive Graphics Analysis for Aircraft Design: Aircraft geometry is displayed on an interactive terminal
See 0011

STRUCTURAL MEMBERS

High-Strength Structural Ceramics: Microstructural flaws are reduced by a new process for making silicon carbide
See 0786

More-Uniform Heat Curing for Structural Repairs: A copper lining helps to distribute the heat under a heating blanket
See 0805

STRUCTURES

Estimating Design Loads in Coupled Vibrating Structures: Approximate spectral analysis is faster and less expensive than transient analysis
See 1001

SUBSONIC CHARACTERISTICS

Wing Subsonic Aerodynamic Performance Estimates: Solution by iteration estimates performance of twisted and cambered wings of arbitrary planform
See 0020

SUBSTRATES

Insulated-Metal Substrates for Hybrid Integrated Circuits: Mass-production potential is evaluated
See 0262

Low-Cost GaAs Solar Cells: A silicon substrate lowers cost and increases efficiency
See 0352

Measuring Elastic Modulus of Sintered Metal: Technique minimizes the effect of the substrate on a thin sintered coating
See 0800

SULFUR

Three-Zone Catalyst Resists Sulfur Poisoning: Zone configuration and composition increase efficiency
See 0437

SULFUR DIOXIDE

Sulfur Dioxide Concentration Analysis From Multiple, Randomly Varying Sources
See 0434

SUPERCONDUCTING MAGNETS

Low Temperature Properties for Fusion Magnets Are Produced
See 0266

Superconducting High-Magnetic Field Lab Pays Off
See 0567

Wire Tester: Detects breaks, changes in cross section, and embedded foreign material
See 0586

SUPERCONDUCTIVITY

Superefficient VAR Controller: A superconducting coil controls reactive power with minimal loss
See 0295

SUPERCONDUCTORS

Superconducting Wire With Improved Strain Tolerance: Winding stresses have a less adverse effect on current-carrying capacity
See 0992

Superefficient VAR Controller: A superconducting coil controls reactive power with minimal loss
See 0370

SUPERCRITICAL EXTRACTION

Supercritical-Multiple-Solvent Extraction From Coal: Large and small molecules dissolve different constituents
See 0137

SUPERCRITICAL FLUID EXTRACTION METHOD

Supercritical Fluid Extraction Method is Developed
See 0136

SUPERSONIC FLOW

New Hydraulic Analogy Instrument Tests Gasdynamic Flows
See 0537

SUPERSONIC NOZZLES

Proposed Short-Throat Supersonic Nozzles: Enlarged, fractional-radius-ratio transonic-nozzle throats promise negligible performance losses
See 0171

Transonic, Axisymmetric Flow Over Nozzle Afterbodies With Supersonic Jet Exhausts: Predictions require less computation than the Navier-Stokes solutions
See 0019

SUPPORTS

Edge Supports for Photovoltaic Modules: Mounting strips are patterned after glazing gaskets
See 0321

Isolating Supports for X-Ray Mirrors: Simple concept reduces effects of gravity, temperature, and magnetism
See 0502

SURFACE FINISHING

Spray Machine For Applying A Polymer Resin Overlay To Road Surfaces
See 0157

Walnut Hulls Clean Aluminum: Hulls inflict minimal substrate damage
See 0840

SURFACE WATERS

WATEQF - A FORTRAN IV Version of WATEQ, a Computer Program for Calculating Chemical Equilibria of Natural Waters (1984 Version)
See 0141

SURFACES

Checking Surface Contours: Rubber impressions are viewed with an optical comparator
See 0601

Flow of Non-Newtonian Liquids After Impact: Nonideal viscoelastic properties speed up spreading of drops on surfaces
See 0965

Nonliquid Process Prepares Plastics for Electroplating: Gaseous-phase preparation is much simpler than conventional liquid-phase preparation
See 0806

Surface-Moisture Monitoring Technique: Technique would monitor the drying of continuous sheets of thin material
See 0721

SURFACTANTS

Oil Recovery Enhancement With Paper Pulp Wastes
See 0420

SURGERY

Computer Model Has Been Developed To Assist Orthopedic Surgeons
See 0849

SUSPENSION SYSTEMS(VEHICLES)

Wheelchair Seat Suspension Has Been Developed
See 0068

SWITCHES

High-Power Switching Transistor: Improved switching transistors handle 400-A peak currents and up to 1,200 V
See 0254

SWITCHING CIRCUITS

Inductive-storage and transfer system provides control of pulse characteristics at high power levels
See 0261

SWITCHING SYSTEMS

Improved Two-Phase Switching Regulator: The coupled-inductor polyphase regulator has better efficiency and lower inductor losses
See 0259

SYNCHROTRON RADIATION

Focusing X-Ray Monochromator for Synchrotron Radiation
See 0485

SYNTHESIS(CHEMISTRY)
New Catalytic Reactions Cut Energy Requirements: Reactions that ordinarily consume a large amount of energy proceed at much lower temperatures
See 0117

SYNTHETIC FUELS
Data On Natural And Synthetic Gas Mixtures is Compiled
See 0316
How Synfuels Behave in Gas Turbines: Combustion products can be different from those of petroleum-based fuels
See 0338

SYSTEMS MANAGEMENT
Control of Self-Replicating Systems: Three concepts are proposed for system management and control
See 0198

TANNING MATERIALS
New Treatment Has Been Developed For Tannery Waste Water Containing Sulfides
See 0418

TECHNICAL ASSISTANCE
National Appropriate Technology Assistance Service Established: The service provides engineering, scientific and commercialization technical assistance for energy-related technologies
See 0357

TELECOMMUNICATION
BURST - A Computer Program of a Meteor Burst Communications Model Used to Predict the Reliability of a Communications System That Uses Meteor Bursts as the Communications Channel
See 0177

TELEMETRY
Fiber-Optic Instrumentation Link: Data transmission is immune to interference
See 0181

TELESCOPES
Lensless Scanning Telescope: Proposed dual-aperture device minimizes aliasing
See 0506

TELEVISION EQUIPMENT
Advanced Technology UHF Receiver Study: Effect on UHF television allotments
See 0176

TEMPERATURE
Stability Test for Transient-Temperature Calculations: A graphical technique gives a rapid indication of stability or instability
See 0990

TEMPERATURE CONTROL
Controlling Heat-Exchanger Outlet Temperature: Nearly constant temperature is maintained regardless of fluid flow
See 0612
Improved Cattle Hauler: Better aerodynamics and ventilation would increase fuel efficiency and decrease shipping losses
See 1013

TEMPERATURE DEPENDENCE
Effect of Temperature on Fiber-Optic Delay: Fiber/jacket interactions affect performance
See 0963

TEMPERATURE MEASUREMENT
Determining Solar-Cell Operating Temperature: A laboratory test measures the effect of windspeed and wind direction
See 0465
Electrical Dissipation Measurement of Polymer Phase Transitions: The change in dipole packing occurring with each transition is sensed by its effect on the dissipation factor
See 0097
Gas-Temperature Measurement With Minimal Perturbation: Heat-flux transducers determine the temperature of hot, high-velocity, turbulent gases
See 0488
Measuring Accurately With Thermocouples: Guidance is provided for detecting errors
See 0514
Measuring Nuclear Fuel Temperatures: Ultrasonic-thermometer system offers the most practicable alternative
See 0518
Measuring Temperature Profiles of Earth's Surface: Thermal properties of earth are measured in situ
See 0524

TEMPERATURE MEASURING INSTRUMENTS
Guide to Calibrating Temperature Devices is Available
See 0490

TENSILE STRENGTH
Determining Tensile Strength of Rocks: Simple, inexpensive method provides tensile strength of rock
See 0903

TENSION TESTS
Measuring Tension in Transistor Suspensions: Vibration analysis is nondestructive and noninvasive
See 0525

TEST CHAMBERS
Acoustic Levitation With Less Equipment: Certain chamber shapes require fewer than three acoustic drivers
See 0447
Design Considerations of Reverberating Chamber
See 0461

TESTS
Economic Model Assesses Benefits of Improved Test Accuracy
See 0623

TEXT EDITORS
Computer Readability Editing System Developed
See 0195

TEXTILE INDUSTRY
Energy Conservation in the Textile Industry: Case histories show how energy costs can be reduced and fossil fuels conserved
See 0324

THERAPY
Device Developed to Treat Head and Neck Tumors
See 0044

THERMAL ANALYSIS
Thermal Modeling of Bridgman Crystal Growth: Heat flow is modeled for a moving or stationary rod-shaped sample inside a directional-solidification furnace
See 0994

THERMAL ENERGY STORAGE EQUIPMENT
The Benefits of Thermal-Energy Storage: Residential sector using this technology may save an estimated 80 million barrels (12.7 x 10(6) m(3)) of oil annually by the year 2000
See 0304

THERMAL INSULATION
Improving a Guarded Hotplate: A modified outer guard ring is heated more uniformly
See 0498
Insulation Cuts Steam Use: Payback for insulating nitrocellular boiling tubs is less than four years
See 0344
Light, Serviceable Insulation Blanket: New features are a lighter facing and easy-to-use fastening system
See 0347
Predicting Thermal Conductivity: An empirical equation accurately predicts thermal conductivity in insulating materials
See 0811
Pull Test Verifies Gap Loading: The force necessary to initiate movement of a thin plastic strip is a measure of the gap tightness
See 0552
Shell-Tile Thermal-Protection System: Upper and lower interlocking caps enclose flexible lightweight insulation
See 1006

THERMAL RADIATION
Thermal Radiation Model Renodalization: Simplified radiation models reduce programing cost
See 0995

THERMIONIC TUBES
Manufacturing Small Thermionic Devices: Circuit layers would be deposited by dc-plasma spraying
See 0267

THERMOCHEMISTRY
WATEQF - A FORTRAN IV Version of WATEQ, a Computer Program for Calculating Chemical Equilibria of Natural Waters (1984 Version)
See 0141

THERMOCOUPLES
Measuring Accurately With Thermocouples: Guidance is provided for detecting errors
See 0514

THERMOGRAPHY
Thermographic Testing of Composite Materials: Techniques and equipment are reviewed
See 0574

THERMOGRAVIMETRY
Low-Temperature Reactions for Waste Disposal: Toxic wastes can be made with low energy expenditure and small capital investment
See 0408
New Catalytic Reactions Cut Energy Requirements: Reactions that ordinarily consume a large amount of energy proceed at much lower temperatures
See 0117

THERMONUCLEAR FUELS
Hollow-Sphere Production Line: After initial formation, spheroids are processed without the contaminating touch of solid objects
See 0651

THERMOPHYSICAL PROPERTIES
Computer Program Available To Calculate Fluid Properties
See 0094
Data On Natural And Synthetic Gas Mixtures is Compiled
See 0316

THERMOPLASTICS
Selection Factors for Plastics: General guidelines and specific examples are presented
See 0824

THERMOSETTING RESINS
Improved Thermosetting Imide Resins: The modified resins have a lower curing temperature
See 0788
Process for Molding Nonreinforced (Neat) Resins: Void-free moldings are obtained for neat, condensation, thermosetting resins
See 0813
Selection Factors for Plastics: General guidelines and specific examples are presented
See 0824

THICKNESS
Improved Coal-Thickness Measurement: Summed signals and a dielectric-filled antenna improve the measurement
See 0915
Measuring Coating Thickness: A gage measures the coating thickness in holes
See 0515
Thickness Gaging of Vapor-Deposited Metal Films: Phase-sensitive eddy-current instrument and microprocessor determine thicknesses with (25-nm) precision
See 0575

THIN FILMS

Low-Temperature Water Diffusion in SiO2 Thin Films: Nuclear-resonance profiling looks into the formation mechanism of IC thin films
See 0109

THYRATRONS

Experimental Linear Thyratron Has Been Fabricated
See 0245

Turning-On Millimeter-Wave Devices with Thyratrons: With suitable provisions in packaging and circuitry, thyratron voltage rises very rapidly
See 0299

TILES

Rewaterproofing Silica Tiles: A waterproofing agent is deposited deep into pores
See 0820

Shell-Tile Thermal-Protection System: Upper and lower interlocking caps enclose flexible lightweight insulation
See 1006

TIME MEASUREMENT

Wristwatch Dosimeter: Besides telling the time, a device indicates radiation dosage and dosage rate
See 0587

TIME SIGNALS

New Time Dissemination Service Available
See 0539

TISSUES(BIOLOGY)

Animal Tissue Specimens Available
See 0843

Tissue Specimens Available for Pathology Studies
See 0891

TOLERANCE LIMITS

Determining Normal-Distribution Tolerance Bounds Graphically: Graphical method requires minimal calculations and table lookup
See 0619

TOOLS

Ball Bearing Assembly Device Developed
See 0595

Bearing Measuring Fixture: Tool increases accuracy and reduces labor
See 0453

Bender/Coiler for Tubing: An easy-to-use tool makes coils of tubing
See 0596

Conveyor Installation Tools
See 0899

Expander for Thin-Wall Tubing: A tool locally expands small-diameter tubes
See 0633

Gage Measures Recessed Gaps: Tool permits fast and easy measurements
See 0487

High-Speed Metal Removal: Ceramic inserts provide higher cutting speeds and longer life
See 0646

Holding Tubes in Place for Brazing: Simple method prevents loosening due to thermal mismatch
See 0649

Hole-Center Locating Tool: Tool alines the center of a new hole with that of an existing hole
See 0650

Locking Bolt: A locking ball in the bolt head holds the wrench in place
See 0667

Machining Three Prongs on a Shaft: A simple tool reduces set-up and machining time
See 0671

Materials Laboratory Demonstrates Automated Sheet Metal Blanking Cell
See 0674

Measuring Recessed Pins: A sleeve-and-rod-tool measures distances in blind locations
See 0519

Mechanical Coal-Face Fracturer: Radial points on a proposed drill bit would take advantage of the natural fracture planes of the coal
See 0919

Portable Roller Staking Tool: Staking tool is compact and portable
See 0686

Quieted Hand-Held Percussion Drills
See 0927

Retaining-Ring Installation Tool: Simple piston device speeds up assembly
See 0702

Stripper for Cables of Any Cross Section: Shoulders prevent penetration any deeper than intended
See 0294

Testing Bearings in Tight Spaces: Tool turns a force around 90 deg to test bearings in cramped places
See 0725

Tool Enlarges Hard-to-Reach Holes: Tool centers itself and cuts to a precise depth
See 0728

Tool for Guiding an Auger: A threaded ram with the same pitch as the auger reduces potential damage to fragile workpieces
See 0729

Tool for Replacing Bushings: The centerlines of the original bushings are maintained
See 0730

Tool for Taking Clay Impressions: Profiles of parts are transferred for measurement
See 0731

Tool for Tightening Bolts With Knurled Heads: A modified clamp transfers a torque to the bolthead
See 0732

Torque-Wrench Extension Arm: Chain-link pulleys transmit torque to hard-to-reach fasteners
See 0736

Wire Retrieves Broken Pin: A safety wire retains the pieces of a broken tool
See 0741

TORQUE

Coaxial Redundant Drives: Harmonic drives allow redundancy and high output torque in a small package
See 0605

Tool for Tightening Bolts With Knurled Heads: A modified clamp transfers a torque to the bolthead
See 0732

Torque Compensator for Mirror Mountings: Device nulls flexural distributions of pivotal torques
See 0735

TOUGHNESS

Crack Growth and Toughness in TRIP Steel: Postulated rate equation integrated for specimen geometry is recommended as a method of analyzing crack growth
See 0760

TOWING

Graphite/Epoxy Tow Bar: Composite bar is as strong as a conventional steel automotive tow bar
See 1012

TOXIC SUBSTANCES

Air Land Water Analysis System (ALWAS): A Multi-Media Model for Toxic Substances
See 0379

Development of a Continuous Monitor for Detection of Toxic Organic Compounds
See 0469

Guidelines for Monitoring Indoor Air Quality
See 0403

Low-Temperature Reactions for Waste Disposal: Toxic wastes can be made with low energy expenditure and small capital investment
See 0408

Rapid Assessment of Potential Ground-Water Contamination Under Emergency Response Conditions
See 0424

Standards For Toxic Metals In Human Urine Are Developed
See 0133

Vibrating Electrode System Improves Trace Element Detection
See 0140

TOXICOLOGY

Detection of Carcinogenicity Based on Mutagenicity in Arabidopsis
See 0854

Studies Show Zinc Deficiency Retards Brain Development In Rats
See 0890

TRACE ELEMENTS

Measuring Trace Hydrocarbons in Silanes: The technique is rapid and uses standard analytical equipment
See 0111

Negative Ion Chemical Ionization Mass Spectroscopy (NICIMS) Successfully Detects Trace Compounds
See 0115

Standards For Toxic Metals In Human Urine Are Developed
See 0133

Vibrating Electrode System Improves Trace Element Detection
See 0140

TRACER STUDIES

Surrogate Hazardous Wastes May Simplify Incinerator Monitoring
See 0435

TRACKED VEHICLES

More Durable Tread for Tracked Vehicles: Aramid fibers added to tread rubber seem to increase durability
See 0804

TRAINING

Computer Readability Editing System Developed
See 0195

Electronic Score Pad Developed
See 0949

Non-Destructive Inspection Technician Capabilities Are Improved
See 0016

Occupational-Safety Workshops: Safety-management-control programs are offered
See 0879

Study to Improve Fire Fighter Training
See 0563

Training Simulator for Fire Management: Users manipulate resources in practicing fire-control strategy
See 0082

Videodisc Technology Is Applied To Visual Display Systems
See 0954

TRAINING DEVICES

Low-Temperature Plenum System Used for Firefighting Training Smoke Generators
See 0077

TRANSDUCERS

Directional Fluid-Flow Transducer: A probe with strain gages detects lateral fluid force
See 0473

Flexible Coupling for Angle Transducer: Flexure strips ensure parallelism between input and output shafts
See 0638

Improved Magnetostrictive Materials Developed
See 0495

Rain and Dew Detector: Moisture between finger-like electrodes actuates a simple alarm circuit
See 0554

TRANSFERRIN

Researchers Produce a Tumor Localizing Agent
See 0884

TRANSFORMERS

Electronic-Power-Transformer Design Guide: A compilation of information on design procedures, electrical properties, and fabrication
See 0241

Electronic-Power-Transformer Design Guide: A compilation of information on design procedures, electrical properties, and fabrication
See 0242

Power Frequency Strengths of Insulation Structures: Study examines recent developments in insulation against power-frequency overvoltage
See 0279

TRANSISTORS

High-Power Switching Transistor: Improved switching transistors handle 400-A peak currents and up to 1,200 V
See 0253

High-Power Switching Transistor: Improved switching transistors handle 400-A peak currents and up to 1,200 V
See 0254

Improved High-Current Drive Circuit: It uses a VMOS field-effect power transistor
See 0258

Measuring Tension in Transistor Suspensions: Vibration analysis is nondestructive and noninvasive
See 0525

X-Ray Inspection of Transistors: A component holder speeds examination of matched pairs
See 0590

TRANSMISSION LINES

Cable Fires Studied
See 0229

Fiber-Optic Communications Cable: Ruggedized cable design meets tough optical, environmental, and mechanical standards
See 0247

Fiber-Optic Instrumentation Link: Data transmission is immune to interference
See 0181

Field Repairs of Optical-Fiber Communication Links: Fixture allows splicing with minimal skill
See 0182

Improving Flat-Cable Manufacturing: Cable rejection rate is reduced by almost half
See 0260

Primer is Developed for Measuring 60-Hz Fields
See 0550

Repairing Damaged Power-Cable Insulation: Simple method saves time, money, and material
See 0287

Shielded Aluminum Flat-Conductor Cable: Thin wiring harness stores compactly
See 0288

Stabilizing Fiber-Optic Transmission Lines: A voltage-controlled optical phase shifter is the key
See 0292

TRANSMISSIONS

Lubricant Effects on Transmission Power Loss: Several lubricants are evaluated for mechanical efficiency
See 1014

TRANSONIC FLOW

Solutions of Transonic Flow in Turbomachines: Accurate approximations are obtained using perturbation techniques
See 0717

Transonic, Axisymmetric Flow Over Nozzle Afterbodies With Supersonic Jet Exhuasts: Predictions require less computation than the Navier-Stokes solutions
See 0019

TRAYS

Control-Chain Safety Tray and Friction Pull: A sprinkler-system control chain is stored above a suspended ceiling
See 0611

TRINITROTOLUENE

Environmental Hazards of TNT: Reactions between TNT and soil components are discussed
See 0398

TRITIUM

National Tritium Labeling Facility
See 0870

TRITIUM COMPOUNDS

National Tritium Labeling Facility
See 0870

TRUCK TRACTORS

Improved Cattle Hauler: Better aerodynamics and ventilation would increase fuel efficiency and decrease shipping losses
See 1013

TRUSSES

Simplified Modeling of Tetrahedral Trusses: Models reduce the time and cost of structural analyses
See 0155

TUBES

Bender/Coiler for Tubing: An easy-to-use tool makes coils of tubing
See 0596

Expander for Thin-Wall Tubing: A tool locally expands small-diameter tubes
See 0633

Holding Tubes in Place for Brazing: Simple method prevents loosening due to thermal mismatch
See 0649

Material Handling Systems for Large Tubes: Handling time can be cut in half
See 0673

Stability of Tube Rows in Crossflow: Two instability mechanisms are identified in heat-exchanger tube bundles
See 0369

Ultrasonic Tube Tester: Probe provides complete scanning of tubular materials
See 0580

TUMORS

Spontaneous Changes in Chromosomes May Be First Detectable Event in The Onset of Tumorigenesis
See 0889

TUNABLE ATOMIC LINE MOLECULAR SPECTROSCOPY

Development of a Continuous Monitor for Detection of Toxic Organic Compounds
See 0469

TUNING DEVICES

Broadly Tunable Picosecond IR Source: Source produces continuously tunable, high-power radiation in the 10- to 20-micro m band
See 0958

Simplified Laser Tuning: Tuning arrangement employs a single grating and two planar mirrors
See 0989

Tuning System for High-Power CO2 Lasers: Problems associated with unstable resonators are minimized
See 0997

TURBINE BLADES

Hot Isostatic Pressing (HIP) Technique Can Improve Certain Alloys Used in Aircraft Engine Turbine Blades
See 0164

Turbin Blades Improved
See 0175

TURBINE PUMPS

Bearing Measuring Fixture: Tool increases accuracy and reduces labor
See 0453

Pumps as Turbines: Low cost and immediate availability are the prime advantages of pumps operated as turbines
See 0690

TURBINES

Calculating the Flow Field in a Radial Turbine Scroll: Finite-difference and finite-element methods give glow solutions
See 0160

Compressible Flow About Wind Turbine Blades: Program solves the three-dimensional potential equation for flow through an arbitrary rotor
See 0313

Off-Design Turbine Modeling: Off-design efficiency and flow function are obtained from design-point input data
See 0166

TURBOMACHINERY

Damping Seals for Turbomachinery: Seals perform a dual function while permitting higher speeds
See 0766

Flow Through a Rotating Turbomachinery Blade Row: Full potential, transonic quasi-three-dimensional flow is calculated
See 0163

Geothermal Power Turbine: Velocity-pump reaction turbine is capable of up to 70 percent energy conversion
See 0333

Solutions of Transonic Flow in Turbomachines: Accurate approximations are obtained using perturbation techniques
See 0368

Solutions of Transonic Flow in Turbomachines: Accurate approximations are obtained using perturbation techniques
See 0717

TURBOPUMPS

Pumps as Turbines: Low cost and immediate availability are the prime advantages of pumps operated as turbines
See 0690

TURBULENCE

Multivalued-Velocity-Field Model of Turbulence: The origin and propagation of vortexes are analyzed
See 0977

ULTRASONIC TESTS

Determining the Orientation of Anisotropic Materials: Ultrasonics probe the direction of tile fibers
See 0466

Inspecting Ingots and Preforms Prior to Hot Forging: Focused ultrasonic beams quickly and rapidly test steel ingots before rotary forging
See 0658

Measuring Nuclear Fuel Temperatures: Ultrasonic-thermometer system offers the most practicable alternative
See 0518

Measuring Slurry Flow: Noncontact ultrasonic instrument is accurate and versatile
See 0520

Ultrasonic Corrosion Monitor: Probe has resolution on the order of 0.004 mils
See 0839

Ultrasonic Detection of Fatigue Cracks: Report notes progress in ultrasonic characterization of crack growth
See 0579

Ultrasonic Tube Tester: Probe provides complete scanning of tubular materials
See 0580

ULTRASONICS

Measuring Ultrasonic Shear-Wave Velocity: A technique using a reference sphere increases accuracy
See 0526

Transducer Joint for Kidney-Stone Ultrasonics: Improved mounting allows joint to last long enough for effective treatment
See 0065

Ultrasonic Blending of Epoxy Curing Agents: Method is fast, safe, and proven effective
See 0139

Ultrasonic Transceiver Has Been Developed To Analyze Orthopedic and Neurological Problems
See 0066

ULTRAVIOLET RADIATION

Accelerated Solar-UV Test Chamber: Medium-pressure mercury-vapor lamps provide a high ratio of ultraviolet to total power
See 0446

ULTRAVIOLET SPECTROMETERS

Laser-Based Vacuum Ultraviolet Spectrometer
See 0504

UNDERGROUND MINING

Guidelines for Placement of Product-of-Combustion Fire Sensors in Underground Mines
See 0491

Tester for Friction Rock Supports
See 0572

UNDERGROUND SUPPORTING
Tester for Friction Rock Supports
See 0572

URANIUM ORES
On-Site Assaying of Uranium Ore: Borehole probe produces and measures the radioactivity of in-place earth samples
See 0924

URINE
Standards For Toxic Metals In Human Urine Are Developed
See 0133

UROLOGIC DISEASES
Transducer Joint for Kidney-Stone Ultrasonics: Improved mounting allows joint to last long enough for effective treatment
See 0065

VACCINES
Live, Recombinant Virus Vaccine May Play Key Role in Disease Prevention
See 0867
NIAID Researchers Create Potential Live, Recombinant Virus Vaccine
See 0876

VACUUM APPARATUS
Fast Closing Valve For Ultrahigh Vacuum Service
See 0635
Laser-Based Vacuum Ultraviolet Spectrometer
See 0504

VACUUM DISTILLATION
Low-Pressure Alcohol Distillation: Heat requirements are lowered for the process
See 0107

VACUUM PUMPS
Cryogenic Vacuum Pump: System provides high pumping capacity, even for noble gases
See 0615

VACUUM SEALS
Better Seals for Vacuum Bags: A roller tool spreads an even layer of adhesive
See 0749

VALVES
Fast Closing Valve For Ultrahigh Vacuum Service
See 0635
Improved Magnetostrictive Materials Developed
See 0495
Lockhopper Valves for Coal Gasifiers: Better valves are under development
See 0666
Pressure Reducing Valve (PRV) To Measure Steam Quality
See 0687
Remotely-Adjustable Pressure-Control Valve: The simple, low-cost design resists leakage and clogging
See 0698
Spool-Valve Pressure-Difference Regulator: Valves maintain a preset pressure difference between gas flows
See 0719

VAPOR DEPOSITED COATINGS
Depositing Sialon Coating on Turbine Rotors: Sialon layer is formed on a refractory substrate via chemical-vapor deposition
See 0162

VAPOR DEPOSITION
Computer Models for IC Fabrication: Process simulations are described for computer-aided design
See 0607

VAPORIZERS
Fluorine Mixer/Vaporizer for Chemical Lasers: The fluorine is vaporized by a flow of helium
See 0968

VARISTORS
High Field Zinc Oxide Varistors
See 0251

VAX-11/780 COMPUTERS
Security Package for the VAX: Four programs deal with intruders and resource management
See 0216

VEGETATION
Standardized Procedures for Planting Vegetation on Completed Sanitary Landfills
See 0433

VEHICLES
Evaluation of Forklift Trucks: Four different types of forklift trucks are evaluated for productivity and economy
See 1011
Holographic Interferometry for Large Structures: Whole vehicular components can be analyzed
See 0493
Robotic Control System for Excavation Equipment: Full automation offers great flexibility
See 0154

VELOCITY
Improved Laser Velocimeter: It can monitor fluid motion in three dimensions
See 0494

VELOCITY MEASUREMENT
Measuring Ultrasonic Shear-Wave Velocity: A technique using a reference sphere increases accuracy
See 0526

VENTILATORS
Better Performance from Line and Check Curtains
See 0895
Improved Cattle Hauler: Better aerodynamics and ventilation would increase fuel efficiency and decrease shipping losses
See 1013

VERY LARGE SCALE INTEGRATION
Computer Models for VLSI Fabrication Processes: A completely new, advanced computer program is now available
See 0608
VLSI Unit for Two-Dimensional Convolutions: Proposed chip could be used for a variety of functions
See 0223

VIBRATION
Estimating Design Loads in Coupled Vibrating Structures: Approximate spectral analysis is faster and less expensive than transient analysis
See 1001
Minimizing Vibrations While Orienting Large Structures: Control algorithm times thrustor pulses to minimize vibrations
See 0271
New Device Simulates Realistic Vibration in Flight Vehicles
See 0535
Time-Domain Modal Vibration Identification: Natural frequencies, damping factors, and damped mode shapes are identified
See 0996
Vibration Analysis Reduces Computer Time: Calculation cost is reduced without loss of accuracy
See 0998

VIBRATION ISOLATORS
Vibration-Isolation Bench for Testing in Vacuum: Precise optical systems can be tested without contamination
See 0584

VIBRATION TESTS
Characterizing Shear Properties of Membranes: Shear stiffness is determined for use in vibration analysis
See 0755

VIDEO CAMERAS
Calibration Markers Produced for Video Camera
See 0230

VIDEO DISKS
Video Disks Make Maps Manageable
See 0933
Videodisc Technology Is Applied To Visual Display Systems
See 0954

VIDEO RECORDING
Imaging Bubble Formation In a Drop Tube: The entire process is under control of a computer
See 0951

VIDICONS
Calibration Markers Produced for Video Camera
See 0230

VINYL RESINS
Flexible Vinyl Strip Doors Decrease Heat Loss
See 0074

VIRUSES
Live, Recombinant Virus Vaccine May Play Key Role in Disease Prevention
See 0867
Method of Continuous Production of Retroviruses (HTL V-III) from Patients with AIDS and pre-AIDS
See 0868
Serum or Plasma Specimens from Transfusion-Transmitted Viruses Study are Available
See 0064

VISCOELASTICITY
Flow of Non-Newtonian Liquids After Impact: Nonideal viscoelastic properties speed up spreading of drops on surfaces
See 0965

VISCOSITY
Modified Antifreeze Liquids for Use on Surfaces: Viscosity agents and antifreeze liquids are evaluated
See 0803

VISUAL AIDS
New Visual Aids Developed For Operational Pilots
See 0061

VOICE COMMUNICATION
Effect of Face Masks on Electronic Speech-Recognizers: A face mask may actually improve recognition accuracy
See 0179
Evaluation of the Comprehension of Non-Continuous, Sped-Up Vocoded Speech: A strategy for coping with fading HF (high frequency) channels
See 0180
Voice Operated Controls and Switches are Developed
See 0067

VOLATILE ORGANIC COMPOUNDS
Optimization of Liquid-Liquid Extraction Methods for Analysis of Organics in Water
See 0121

VORTICES
Eliminating Wind-Tunnel Flow Breakdown: Floor nozzle ensures more realistic airflow
See 0482

WALKING
Adjustable Walker for the Handicapped: The front legs adjust at the touch of a lever for use on stairs or ramps
See 0039

WALNUT HULLS
Walnut Hulls Clean Aluminum: Hulls inflict minimal substrate damage
See 0840

WARNING SYSTEMS
Improved O2/H2 Gas-Mixture Sensor: Monitor of mixture concentration uses a catalyzed and an uncatalyzed temperature probe
See 0496
In-Mine Remote Actuated Stench Gas Warning System
See 0917
LANDSAT Emergency Access and Products (LEAP)
See 0148
Spill Alert Device for Earth Dam Failure Warning
See 0156
Submarine Air Monitoring System Improved
See 0564

WASTE DISPOSAL
Compatibility of Grouts with Hazardous Wastes
See 0389
Low-Temperature Reactions for Waste Disposal: Toxic wastes can be made with low energy expenditure and small capital investment
See 0408
Mobile System for Extracting Spilled Hazardous Materials from Excavated Soils
See 0411
Packaging Nuclear and Chemical Waste for Disposal: Waste would be encapsulated in hollow silicon spheres
See 0422

WASTE HEAT UTILIZATION
Heating Greenhouses With Waste Heated Water: Industrial-waste heated water reduces greenhouse energy costs
See 0335

WASTE OILS
Waste Oils Fuel Navy Boilers
See 0443

WASTE RECYCLING
Alternate Treatment of Organic Solvents and Sludges from Metal Finishing Operations
See 0380
Analyzing Resource Recovery From Waste: The economics of conventional landfill disposal can be compared with the economics for material and energy recovery
See 0383
Energy and Solid/Hazardous Waste: Data are presented on wastes from a variety of energy technologies
See 0395
Recycling Lithium Carbonate/Lithium Hydroxide Waste: A hazardous-waste disposal problem is eliminated by regeneration
See 0425
Removing PCB's From Oils: Contaminated oil can be cleansed and recycled, and the PCB's disposed of in the prescribed manner
See 0428

WASTE UTILIZATION
Dewatering Peat With Activated Carbon: A proposed process should produce enough gas and carbon to sustain itself
See 0319
Energy and Solid/Hazardous Waste: Data are presented on wastes from a variety of energy technologies
See 0395
Generating SiF4 From H2SiF6: Sodium and barium fluorosilicates are precipitated and then thermally decomposed into silicon tetrafluoride
See 0100
Industrial Waste Exchanges: Industrial wastes of one company can be a valuable resource to another
See 0404
Oil Recovery Enhancement With Paper Pulp Wastes
See 0420
Retort Utilizes Oil-Shale Fines: Additional energy is extracted, and waste disposal is simplified
See 0929

WATER
Low-Temperature Water Diffusion in SiO2 Thin Films: Nuclear-resonance profiling looks into the formation mechanism of IC thin films
See 0109

WATER ANALYSIS
Asbestos Fiber Determination in Water Samples: Preparation techniques, improved analytical method, and rapid screening
See 0384
Ion Chromatography Monitors Environmental Waters: New technique provides rapid results with high accuracy
See 0405
Optimization of Liquid-Liquid Extraction Methods for Analysis of Organics in Water
See 0121

WATER CHEMISTRY
WATEQF - A FORTRAN IV Version of WATEQ, a Computer Program for Calculating Chemical Equilibria of Natural Waters (1984 Version)
See 0141

WATER DISTRIBUTION
A Guidance Has Been Developed To Evaluate Existing Water Distribution Systems
See 0147

WATER HEATERS
Bricks and Cans for Thermal Storage: Water-filled cans and bricks provide efficient thermal storage for solar space and hot-water heating
See 0305
Reliability Guidelines for Solar Hot-Water Systems: Document consolidates available information in one publication
See 0080

WATER JETS
Robotic Water-Blast Cleaner: Automated system will be fast, safe, and efficient
See 0707

WATER POLLUTION
Air Land Water Analysis System (ALWAS): A Multi-Media Model for Toxic Substances
See 0379
Analytical Procedures for Aniline and Selected Derivatives in Wastewater and Sludge
See 0382
Energy and Water Resources: Data on uses, problems, and regulations are presented
See 0907
Energy Integrated Farm System: Mathis Farm and Georgia Institute of Technology
See 0023
Environmental Hazards of TNT: Reactions between TNT and soil components are discussed
See 0398
Evaluation of a Containment Barrier for Hazardous Material Spills in Watercourses
See 0400
An Instrument for the Investigation of Particle Fluxes in Marine and Fresh Waters
See 0499
Methods for Determining the Location of Abandoned Wells
See 0920
Model Developed To Simulate Dredged Material Movement
See 0412
Numerical Models of Water Quality Conditions Are Developed
See 0419
The Ocean Pollution Data and Information Network (OPDIN)
See 0944
Rapid Assessment of Potential Ground-Water Contamination Under Emergency Response Conditions
See 0424

WATER POLLUTION CONTROL
Activated Carbon Process for the Treatment of Cadmium(II)-Containing Wastewaters
See 0378
EPA Macroscopic Planning Model (EPAMAC) for Stormwater and Combined Sewer Overflow Control: Application Guide and User's Manual
See 0399
A Modular Transportable Process Development Unit For Wastewater Treatment Polishing Studies
See 0414
New Treatment Has Been Developed For Tannery Waste Water Containing Sulfides
See 0418
Process for Removing Heavy Metal from Water is Developed
See 0423
Three New Techniques for Floating Pollutant Spill Control and Recovery
See 0436
Treating Wastewater From Coal Liquefaction: Treatment process reduces pollutant concentrations below EPA levels
See 0439
Treatment of Plating Wastewater: A survey of treatment practices shows need for uniformity and improvements
See 0440
Wet Oxidation and Ozonation of Specific Organic Pollutants
See 0445

WATER POLLUTION DETECTION
Asbestos Fiber Determination in Water Samples: Preparation techniques, improved analytical method, and rapid screening
See 0384
Flowthrough Bacteria-Detection System: An online system allows repetitive cycling of sample intake, bacteria counting, and sterilization
See 0484
Ion Chromatography Monitors Environmental Waters: New technique provides rapid results with high accuracy
See 0405
Optimization of Liquid-Liquid Extraction Methods for Analysis of Organics in Water
See 0121

WATER QUALITY
Descriptions For Reservoir Chemical Processes Are Developed
See 0144

WATER SUPPLY
Cost Estimating Methods for Water Supply Planning Are Developed
See 0900
Energy and Water Resources: Data on uses, problems, and regulations are presented
See 0907
New Technology Stretches Scarce Water for Irrigation
See 0028

WATER TREATMENT
Simplified Procedures Have Been Developed for Calculating Chemical Doses for Water Stabilization
See 0430

WATERPROOFING
Reducing Housing Moisture Damage in Humid Climates
See 0079
Rewaterproofing Silica Tiles: A waterproofing agent is deposited deep into pores
See 0820

WATT HOUR METERS
Electricity Calibration Service For Wattmeters and Watthour Meters
See 0477

WATTMETERS
Electricity Calibration Service For Wattmeters and Watthour Meters
See 0477

WAVEGUIDES
Estimating Waveguide-Feed Directivity and Spacing: Approximate curves simplify initial steps of antenna design
See 0244
Fabricating Slotted-Waveguide Arrays From Sheet Metal: Low-cost lightweight waveguides are formed from rolls of aluminum
See 0246
Near-Field Antenna Measurements Approximated
See 0273
Optical-Fiber-to-Channel-Waveguide Coupler: A holding device is made by etching V-shaped grooves in silicon
See 0275

WEAR
Reducing Drill Bit Wear Through Electrochemistry: A small source of electrical power downhole makes bits last longer
See 0694

WEATHER FORECASTING
Frost Forecasting for Fruitgrowers: Progress in forecasting from satellite data is reviewed
See 0035

WEED CONTROL

Feasibility of Applying Genetic Engineering Technology to Aquatic Plant Control is Studied
See 0856

Simulating Mechanical Control Operations: A computer model can simulate mechanical harvesting operations using any specific mechanical system operated in any realistic environment
See 0887

WEIGHT MEASUREMENT

Portable Pallet-Weighing Apparatus: Weighing is safer and more convenient
See 0546

WELDED JOINTS

Checking Surface Contours: Rubber impressions are viewed with an optical comparator
See 0601

Checking Weld Composition: Inconel 718 alloy welds are tested for the presence of filler metals
See 0602

The Effects of Porosity in Welds: Five different levels of porosity are studied
See 0624

Repairing Defective Welds: Welds are reinforced by electrodeposition
See 0699

WELDING

Absorbable-Susceptor Welding of Ceramics: The susceptor would become part of the joint
See 0592

Coil-Welding Aid: A positioner holds a coil inside a cylinder during tack welding
See 0606

Computer-Controlled Laser Welding: Limited access joints in a gas-turbine recuperator are welded using a moving-mirror, computer-controlled CO2 laser
See 0609

Electronic Force Gage for Welders: Welding force is monitored in process
See 0480

Monitoring Welding With Acoustic Emissions: Technique is useful for in-process evaluation
See 0677

WELL LOGGING

Electronic Parts for Geothermal-Well Logging: Performance and endurance are examined at high temperature
See 0906

WELLS

Design, Construction and Development of In Situ Mining Wells
See 0902

Drill-Pipe Severing Tool for Geothermal Wells: Explosive device is compatible with high borehole temperatures
See 0905

Methods for Determining the Location of Abandoned Wells
See 0920

WET METHODS

Wet Oxidation and Ozonation of Specific Organic Pollutants
See 0445

WHEEL CHAIRS

New Designs Have Been Developed for Personal Lifts
See 0058

WHEELCHAIRS

Wheelchair Seat Suspension Has Been Developed
See 0068

WILDLIFE

Procedures For Airborne Sensors Are Developed
See 0551

WIND POWER

Renewable Energy for Industry: Guidance is given for evaluating and financing biomass, waste, solar, and wind sources
See 0365

WIND POWER GENERATION

Compressible Flow About Wind Turbine Blades: Program solves the three-dimensional potential equation for flow through an arbitrary rotor
See 0313

Integrating Wind Turbines Into a Conventional Utility
See 0345

National Appropriate Technology Assistance Service Established: The service provides engineering, scientific and commercialization technical assistance for energy-related technologies
See 0357

Value of Wind and Solar Thermal Energy: Computer programs allow utilities to determine overall electric-energy production costs
See 0375

WIND TUNNEL MODELS

Two-Degree-of-Freedom Mount System for Flutter Models: Flexible rods replace conventional bearing supports to minimize structural damping
See 0577

WIND TUNNELS

Eliminating Wind-Tunnel Flow Breakdown: Floor nozzle ensures more realistic airflow
See 0482

Measuring Surface-Shear Stress in a Wind Tunnel: Two-wire skin-friction gage gives both magnitude and direction of mean and fluctuating stresses
See 0523

WIND TURBINES

Compressible Flow About Wind Turbine Blades: Program solves the three-dimensional potential equation for flow through an arbitrary rotor
See 0313

Wind Turbine With Concentric Ducts: Proposed device would be relatively compact and efficient
See 0376

WIND(METEOROLOGY)

Simulating Atmospheric Turbulence: Dimensionless time series for gusts and gradients have been calculated with a model
See 0037

WINGS

Circulation Control Upper Surface Blowing High-Lift Wing Developed
See 0003

Lift Effect of Cambered Calculating the Vortex-Wings: Program computes the vortex-lift effect by using an improved supersonic suction analogy
See 0012

Minimum Induced Drag of Nonplanar Wings: Numerical optimization techniques calculate the required bound-circulation distribution
See 0013

Subcritical Wing Design Code: program uses higher-order far-field drag minimization
See 0018

Wing Subsonic Aerodynamic Performance Estimates: Solution by iteration estimates performance of twisted and cambered wings of arbitrary planform
See 0020

WIRE

Wire Tester: Detects breaks, changes in cross section, and embedded foreign material
See 0586

WIRE ROPE

Magnetic Wire-Rope Tester: Rope interiors can be inspected nondestructively
See 0511

WOOD

Drying Wood With the Sun: Booklet shows how to build a solar-heated firewood dryer
See 0770

Fire Retardants in Packaging: Wooden boxes and fiber containers for ammunition storage are treated with fire retardant to eliminate spread of fire
See 0779

WOOD PILINGS

Control of Decay in Above-Water Marine Pilings
See 0940

WOOD PRESERVATIVES

Control of Decay in Above-Water Marine Pilings
See 0940

WOOD WASTES

Oil Recovery Enhancement With Paper Pulp Wastes
See 0420

WORK MEASUREMENT

Air Force Develops Subjective Workload Assessment Technique
See 0040

WORMS

Parasite Specimens Available
See 0880

WRENCHES

Conveyor Installation Tools
See 0899

Locking Bolt: A locking ball in the bolt head holds the wrench in place
See 0667

Torque-Wrench Extension Arm: Chain-link pulleys transmit torque to hard-to-reach fasteners
See 0736

WRIST WATCHES

Wristwatch Dosimeter: Besides telling the time, a device indicates radiation dosage and dosage rate
See 0587

X RAY ANALYSIS

Instrument is Developed to Measure Lead in Human Tibia
See 0500

Linear Position-Sensitive X-Ray System
See 0508

X RAY DETECTORS

A Portable Radiation Monitor: Battery-operated monitor detects and identifies radiation on site
See 0547

Viewer Makes Radioactivity Visible: A battery-operated viewer could aid in contamination surveys and medical diagnoses
See 0585

X-Ray Detector for 1 to 30 keV: Array of deep silicon cells can be used for imaging or spectroscopy
See 0588

X RAY DIFFRACTION

Multipurpose X-Ray Residual-Stress Analyzer: System is portable for field inspections
See 0533

X-Ray Diffraction Polarization: Polarization ratios are key factors in applying X-ray diffraction methods for accurate analysis of materials
See 0589

X-Ray-Diffraction Residual-Stress Analysis: Nondestructive method allows measurement of surface stresses in metal and ceramic materials
See 0591

X RAY FLUORESCENCE

Development, Design, and Operation of a Cascade Impactor
See 0470

X RAY INSPECTION

X-Ray Inspection of Transistors: A component holder speeds examination of matched pairs
See 0590

X RAY TELESCOPES

Isolating Supports for X-Ray Mirrors: Simple concept reduces effects of gravity, temperature, and magnetism
See 0502

X RAYS

Focusing X-Ray Monochromator for Synchrotron Radiation
See 0485

Normal-Incidence Soft-X-Ray Mirror: A multilayered interference structure has about 6 percent reflectivity
See 0540

XENON CHLORIDE LASERS
Scanning XeCl Laser: Potential applications of the narrow-bandwidth laser include remote sensing and high-resolution spectroscopy
See 0986

YAG LASERS
System Measures Low-Level Laser Pulses
See 0569

ZETA POTENTIAL
Determining the Point of Zero Zeta Potential in Solid Samples: In a new technique, the sample does not have to be in powder form
See 0467

ZINC
Studies Show Zinc Deficiency Retards Brain Development In Rats
See 0890

ZINC OXIDES
High Field Zinc Oxide Varistors
See 0251

ZIRCONIUM ALLOYS
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New Practical Technologies—Fact Sheets 4
New Practical Technologies—Catalogs 5
Government Inventions for Licensing—Newsletter 6
Government Inventions for Licensing—Catalogs 7
Directory of Federal Technology Resources 8

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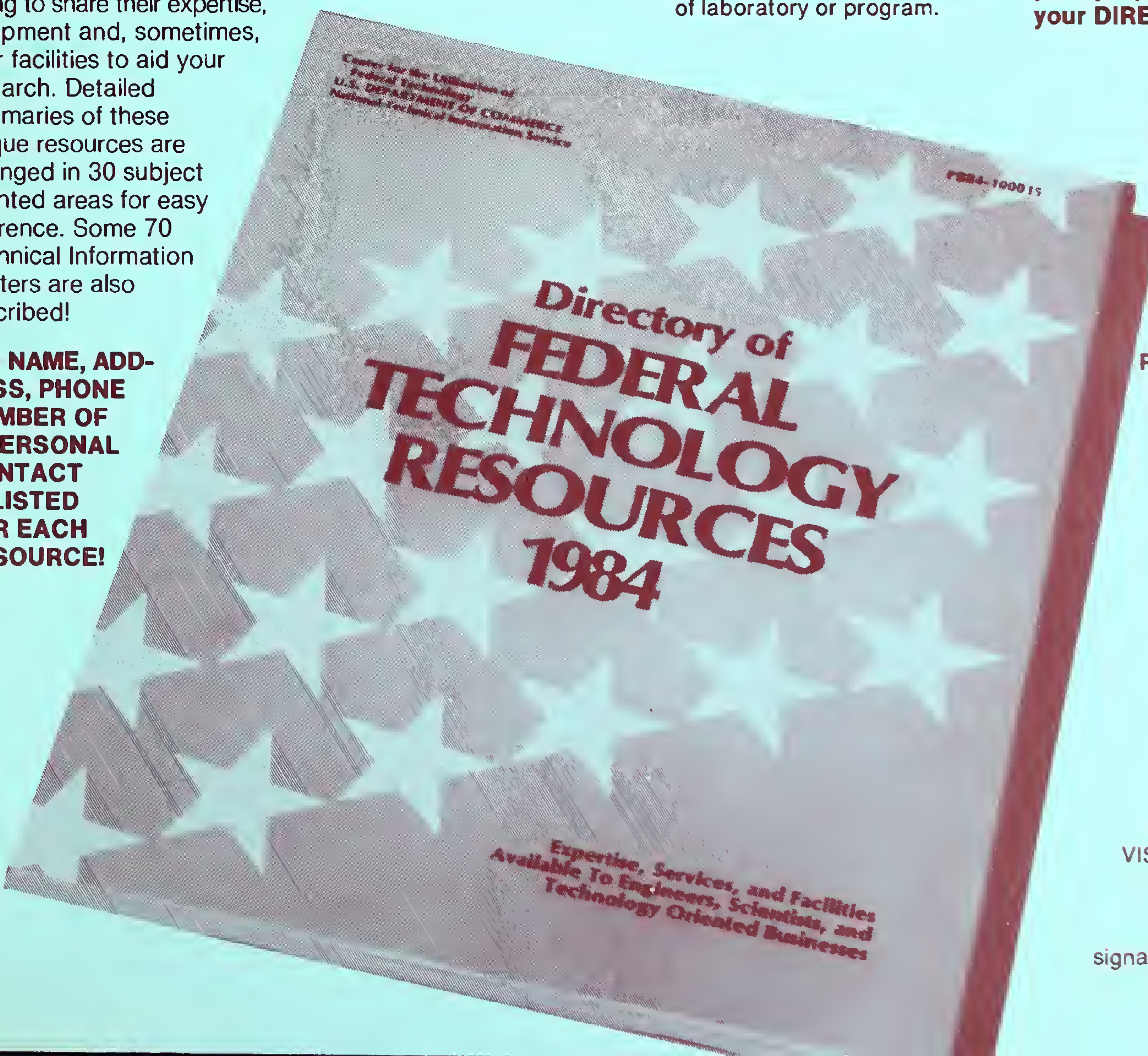
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